SME Development and Subcontracting in Indonesia: A Comparison with Japan's Historical Experience

Mitsuhiro Hayashi

A thesis submitted for the degree of
Doctor of Philosophy
of The Australian National University

July 2002

THE AUSTRALIAN NATIONAL UNIVERSITY

I hereby declare that
this thesis is my original work,
unless otherwise indicated in the text.

林 光洋

Mitsuhiro Hayashi
School of Economics
Faculty of Economics and Commerce
July 2002

Acknowledgments

I would like to take this opportunity to express my gratitude to many individuals and organisations for their extending warm help and strong encouragement to me during my study at the Australian National University (ANU).

I would like to thank my supervisor, Dr. Pierre van der Eng, for his excellent guidance, sharp comments and warm encouragement from the first stage of my Ph.D. program at ANU. He, together with his wife, Ms. Akemi Inoue, has always taken care of me in the areas of both academic and personal life. The same appreciation goes to Professor Hal Hill, my thesis adviser, who shared with me some of his invaluable knowledge on the Indonesian economy as a whole and Indonesian SMEs in particular. He kindly spent his precious time in repeatedly reading and commenting on my draft chapters. My sincere thanks also go to Professor Tessa Morris-Suzuki, another adviser, who involved me in research activities related to Japan's issues. She gave me detailed and constructive comments on Japan's historical experience. Dr. Peter van Diermen, although not on my supervisory panel, kindly helped me to design SME research and field survey in Indonesia.

Japan International Cooperation Agency (JICA), the Indonesian Ministry of Industry and Trade (MOIT) and many other individuals/organisations assisted me in undertaking my firm-level survey in Indonesia between 1999-2000. My special thanks are to Mr. Toshio Kinoshita, Mr. Hiroyo Sasaki, Mr. Soedarmasto and his staff, Ms. Ratna Djuwita, Mr. Agus Tjahajana and his staff, Mr. Hamdhan Nurdin, and Mr. Rahman Salam and his colleagues, for their great help with my field survey in Indonesia. I thank Mr. Eisuke Yamashita, who kindly offered me accommodation in Jakarta. I deeply acknowledge the warm support from many private firms in Indonesia that generously responded to my interview and questionnaire survey.

My sincere gratitude must go to Professor Masaru Saito and Professor Takahiro Akita, both of whom made me recognise the importance of development issues a long time ago and have taken care of me and my family until now. My thanks are also to Professor Hisao Kibune and Professor Matsuyo Makino, who have continuously facilitated my academic activities.

My appreciation goes to Professor Susumu Hondai, Dr. Yuri Sato, Professor Mohammad Sadli, Professor Hirohisa Kohama, Dr. Tulus Tambunan, Mr. Safiun, Dr. Idris Sulaiman, Mr. Yoshio Nakamura, Professor Norio Tominaga, Professor Masahiro Nakashima, Professor Kosuke Mizuno, Dr. George Quinn, Dr. Norimichi Toyomane, Ms. Yukino Komuro-Aizawa, Mr. Katsuhide Takahashi, Ms. Tomoko Kobayashi, Mr. Taichi Sakano, Professor Konosuke Odaka, Dr. Keiko Tamura, Dr. Tetsuro Hamada, Mr. Kazuhito Mukawa, Mr. Yoshiya Kitamura, Mr. Tsugiya Ogura, and Dr. Herry Darwanto, for their comments, advices, research materials or encouragements.

Special thanks go to Mr. Haruki Yoshida and Ms. Maxine McArthur for their warm help and excellent thesis editing. I am thankful to Reader Ben Smith, Ms. Zann Miranda, and Ms. Joan Rabey, for their administrative support at the School of Economics and the Faculty of Economics and Commerce.

My gratitude is to Mr. Satoshi and Ms. Ikuko Tohsaka, Mr. Yoshiyuki and Ms. Mayumi Ito, and Professor Nobutaka and Ms. Chieno Taguchi for their cordial support from Japan. My appreciation is to Mr. Peter and Ms. Elizabeth Cox, Dr. Garth and Ms. Helen Pilkinton, Mr. Shunichi and Ms. Makiko Ikeda, Mr. Kazuyuki and Ms. Sachiko Matsushita, Mr. Naoki Matsumoto, Ms. Yasuko Nakagawa and many other people who warmly assisted me in Canberra.

I should like to thank my wife's parents, her sisters' families, my mother, and my sister's family, who have always extended unconditional support to us. Finally, my greatest debt is to my wife and two sons, Sachiko, Taisuke and Yosuke, who understood me, helped me, and endured the language barrier, financial difficulties, and traffic problems in Canberra for more than four years.

Abstract

This study discusses small- and medium-scale enterprises (SMEs) and subcontracting in the context of economic development in contemporary Indonesia. The main questions are whether and how SMEs have contributed to economic development in Indonesia, how and why subcontracting linkages between SMEs and large-scale enterprises (LEs) have been (or have not been) established and developed in Indonesia, and whether and how subcontracting can be beneficial to SME development in Indonesia. In addressing these questions, the study analyses the Indonesian manufacturing industry, particularly the machinery industry, based primarily on firm-level data and information obtained from an interview and questionnaire survey, with reference to Japan's historical experience.

Starting with the setting of the research framework, the first part of this study reviews the development of SMEs and subcontracting systems in Japan during the twentieth century to extract the essence of its historical experience. Subsequently, several indicators and productivity growth by firm size based on nation-wide statistical data, along with an overview of Indonesian economy, manufacturing industry and SMEs, are presented to examine SME development in Indonesia and its contribution to the economy.

In the second part of this study, micro-level evidence obtained from sample firms in the automobile, motorcycle, agricultural machinery and bicycle subsectors is used to supplement the lack of Indonesian manufacturing statistics related to

subcontracting. Our firm-level survey first investigates what kind of external sources metalworking and machinery SMEs have used as support mechanisms and how useful such sources are for SMEs in developing their technological, marketing and financing capabilities. Next, production functions and indices of total factor productivity (TFP) are estimated to examine whether subcontracting linkages with large-scale enterprises (LEs) enabled SMEs to improve their productivity. Thereafter, qualitative data from our firm-level survey are used to explain how and why subcontracting linkages are established and can be crucial to SME development. The study then explores the detailed characteristics of subcontracting ties in Indonesia, from the perspective of large-scale parent firms.

The results of this study confirm that subcontracting linkages with LEs generally enabled SMEs to alleviate some constraints stemming from their limited internal resources, improve their capabilities and production efficiency, and contribute to economic development not only in Japan but also in Indonesia. The provision of technological and marketing support mechanisms and the improvement of production efficiency are the major common gains for SMEs obtained from subcontracting transactions with LEs. Subcontracting systems in the Indonesian machinery industry have developed as a vertical production mode and can be beneficial to the development of SMEs.

Table of Contents

Declaration	i
Acknowledgements	ii
Abstract	iv
Table of Contents	vi
List of Tables	xii
List of Figures	xviii
Glossary and Abbreviations	xix

1. Introduction **1**

1.1 Economic Development, SMEs and Subcontracting in Indonesia at Present 2

1.2 Japan's Experience with Economic Development, SMEs and Subcontracting 7

1.3 Purpose and Approach of the Study 9

1.4 Structure of the Study 10

2. Framework of the Study **13**

2.1 Introduction 13

2.2 Roles of SMEs in Economic Development 14

2.2.1 Contributions of SMEs in Developing Economies 14

2.2.2 Growth Constraints for SMEs in Developing Economies 22

2.2.3 SMEs in Developing Economies in Different Contexts 23

2.3 Theoretical Framework of Subcontracting for SME Development 28
2.3.1 Vertical Production Systems 29
2.3.2 Subcontracting for the Development of SMEs 34
2.3.3 Types of Subcontracting Linkages in Developing Economies 37
2.3.4 Difficulties with and Conditions for Subcontracting Arrangements in Developing Economies 41
2.4 Research Questions 44

3. SME Development and Subcontracting in the Japanese Manufacturing Industry: The Historical Experience 48
3.1 Introduction 48
3.2 SMEs and the Initiation of Subcontracting in Japan before World War II 50
3.2.1 Economic Development and SMEs in Japan before World War II 52
3.2.2 Putting-out Systems as a Prototype of Subcontracting Systems 56
3.2.3 Emergence of Subcontracting Systems in the 1930s 58
3.3 SME Development through Subcontracting in Japan after World War II 66
3.3.1 High Economic Growth and SMEs in the Postwar Japan 67
3.3.2 Development of Subcontracting Systems after World War II 72
3.3.3 Subcontracting in the Machinery Industry 83
3.3.4 Is Subcontracting in Japan Unique? 87
3.4 Subcontracting Linkages as Support Mechanisms for SMEs in Japan 90
3.5 Subcontracting and Productivity of SMEs in Japan 96
3.6 The Essence of Japan's Historical Experience with SME Development through Subcontracting 102

4. Development of SMEs and Subcontracting in the Indonesian Manufacturing Industry **108**

4.1 Introduction 108

4.2 Economic Development in Indonesia 109

4.2.1 Economic Growth and Structural Changes in Indonesia 109

4.2.2 A Brief History of the Manufacturing Industry in Indonesia until the 1960s 119

4.2.3 Development of the Indonesian Manufacturing Industry since the Early 1970s 122

4.3 SME Development in Indonesia 133

4.3.1 Definition of SMEs in This Study 133

4.3.2 Policies and Measures for SME Development in Indonesia 136

4.3.3 An Overview of SME Development in Indonesia 140

4.4 Economic Performance and Productivity Growth of the Indonesian Manufacturing Industry by Firm Size 146

4.4.1 Economic Performance of SMEs and LEs in Indonesia 146

4.4.2 Productivity Growth of SMEs and LEs in Indonesia 151

4.5 SMEs and Subcontracting in Indonesia 158

4.6 Conclusion 162

Appendix 4.1 Estimation of Capital Stock in the Manufacturing Industry 165

5. Introduction to Micro-level Survey in Indonesia **167**

5.1 Introduction 167

5.2 Background of the Field Survey in Indonesia 168

5.3 Methods of Firm-level Survey 170

5.4 Basic Characteristics of the Sample Firms 173

5.5 Basic Characteristics of the Related Subsectors 180

5.5.1 Automobile Subsector 180

5.5.2 Motorcycle Subsector 185

5.5.3 Agricultural Machinery Subsector 186

5.5.4 Bicycle Subsector 188

6. Support Mechanisms for SME Development in Indonesia: Qualitative Evidence from SMEs **191**

6.1 Introduction 191

6.2 Support Mechanisms of Technology Acquisition for SMEs 194

6.3 Support Mechanisms of Marketing for SMEs 203

6.4 Support Mechanisms of Financing for SMEs 208

6.5 Subcontracting Linkages as Support Mechanisms of SME Development 214

7. The Role of Subcontracting in SME Development in Indonesia: Quantitative Evidence from SMEs **219**

7.1 Introduction 219

7.2 Survey Method and Characteristics of the Sample SMEs 223

7.2.1 Survey Method 223

7.2.2 Characteristics of the Sample SMEs 224

7.3 Framework of Statistical Analysis: Estimates of Production Functions 231

7.4 Results of Statistical Analysis 236

7.5 Comparison of Total Factor Productivity 245

7.6 Subcontracting and Productivity of SMEs 250

Appendix 7.1 Description of the Main Data 253

8. Subcontracting Linkages and SME Development in Indonesia: Qualitative Evidence from SMEs **256**

8.1 Introduction 256

8.2 Survey Method and Characteristics of the Sample SMEs 261

8.3 Motivations for and Initiation of Subcontracting Linkages with Parent Firms 264

8.3.1 Motivations for Subcontracting Linkages with Parent Firms 264

8.3.2 Initiation of Subcontracting Linkages with Parent Firms 271

8.4 Types of Subcontracting Linkages with Parent Firms 275
8.5 Costs of and Benefits from Subcontracting Linkages with Parent Firms 285
8.5.1 Costs Associated with Subcontracting Linkages with Parent Firms 286
8.5.2 Benefits Obtained from Subcontracting Linkages with Parent Firms 294
8.6 Elements for the Better Functioning of Subcontracting Linkages 301
8.6.1 Elements for the Functioning of Subcontracting Linkages: Overall Benefits 302
8.6.2 Elements for the Functioning of Subcontracting Linkages: Technical and Marketing Support 306
8.7 Subcontracting Mechanisms in Indonesia: Evidence from SMEs 310

9. Subcontracting Transactions and SME Development in Indonesia: Qualitative Evidence from Parent Firms 316

9.1 Introduction 316
9.2 Survey Method and Characteristics of the Sample Parent Firms 321
9.3 Motivations for Subcontracting Transactions with SMEs 323
9.4 Types of Subcontracting Linkages with SMEs 328
9.5 Costs of and Benefits from Subcontracting Transactions with SMEs 334
9.5.1 Costs of Subcontracting Transactions with SMEs 335
9.5.2 Benefits from Subcontracting Transactions with SMEs 340
9.5.3 Cost-Benefit Balance of Subcontracting Transactions with SMEs 347
9.6 Willingness of Parent Firms to Support SMEs in Subcontracting Transactions 348
9.7 Subcontracting Transactions and Support Mechanisms for SMEs: Evidence from Parent Firms 353

10. Conclusion: SME Development and Subcontracting in Indonesia at Present and Japan in the Past **359**

10.1 Introduction 359

10.2 Summary of the Main Findings: Japan in the Past and Indonesia at Present 360

10.3 Conclusion: Implications for the Development of SMEs through Subcontracting based on a Comparison between Indonesia at Present and Japan in the Past 366

References **372**

List of Tables

2.1	Share of SMEs in the Manufacturing Industry: East Asian Countries	17
3.1	Growth of and Share in Employment in Japanese Primary, Modern and Traditional Industries, 1881-1935	51
3.2	Share of Product Goods in Production, Exports and Imports in Japan, 1882-1980 (Annual Averages)	53
3.3	Share of SMEs in the Japanese Manufacturing Industry, 1909-1980	54
3.4	Differences in Wages in the Japanese Manufacturing Industry by Firm Size, 1909-1980	60
3.5	Subcontracting in the Japanese Machinery Industry in 1934	62
3.6	Growth and Share of Production in the Japanese Manufacturing Industry, 1950-1980	68
3.7	Capital Intensity, Productivities and Wage Rates in the Japanese Manufacturing Industry by Firm Size, 1957 and 1966 (Firm Size 30-49 = 100)	70
3.8	Capital Intensity, Productivities and Wage Rates in Four Sectors of the Japanese Manufacturing Industry by Firm Size and Sector in 1966 (Firm Size 30-49=100)	71
3.9	Share of Japanese SMEs with Subcontracting Transactions with Parent Firms, 1971 and 1976	78

3.10 Share of Japanese LEs which Purchased Inputs from Supplier Firms through Subcontracting Transactions, 1971 and 1976 79

3.11 Support from Parent Firms through Subcontracting Linkages: the Japanese Automobile and Agricultural Machinery Subsectors in the Late 1950s 93

3.12 Channels and Effectiveness of Technology Support Mechanisms for Auto Parts SMEs in Ohta City, Gunma Prefecture, Japan in the Early 1990s 95

3.13 Total Factor Productivity (TFP) Growth and the Ratio of TFP Growth to Value Added Growth in Japanese Manufacturing SMEs and LEs, 1966-1972 (Percentages) 98

3.14 Determinants of TFP Growth in Japanese Manufacturing SMEs and LEs, 1966-1972 99

3.15 Labour Productivity Growth and Total Factor Productivity Growth in Japanese Manufacturing SMEs and LEs, 1965-1982 (Percentages) 100

3.16 Determinants of the Ratio of TFP Growth to Labour Productivity Growth in Japanese Manufacturing SMEs, 1965-1982 101

4.1 Growth and Sectoral Share of GDP in Indonesia, 1966-2000 112

4.2 Growth and Sectoral Share of Employment in Indonesia, 1961-1999 115

4.3 Exports, Imports and Foreign Direct Investment in Indonesia, 1966-1999 116

4.4 Sectoral Share of Export and Import Commodities in Indonesia, 1966-1999 117

4.5	Growth of and Sectoral Share in Real Value Added in Indonesia's Non-Oil/Gas Manufacturing Industry, 1971-1999	123
4.6	Growth of and Sectoral Share in Employment in Indonesia's Non-Oil/Gas Manufacturing Industry, 1971-1999	127
4.7	Sectoral Share of Indonesia's Non-Oil/Gas Manufactured Exports and Imports, 1971-1999	129
4.8	Export Intensity and Imported Inputs Ratio of Indonesia's Non-Oil/Gas Manufacturing Industry, 1990-1998	131
4.9	Geographical Distribution of Value Added in Indonesia's Non-Oil/Gas Manufacturing Industry, 1983, 1990 and 1998	133
4.10	Definition of Manufacturing SMEs in Asian and Pacific Countries	135
4.11	Policies, Programs and Organisations for SME Development in Indonesia	139
4.12	Growth of Value Added and Employment in Indonesia's Non-Oil/Gas Manufacturing Industry by Firm Size, 1986-1999	142
4.13	Share of SMEs in Indonesia's Non-Oil/Gas Manufacturing Industry, 1974/75-1999	143
4.14	Economic Performance of Indonesia's Non-Oil/Gas Industry by Firm Size in 1986, 1996 and 1999	148
4.15	Growth of Labour Productivity and Total Factor Productivity (TFP) in Indonesia's Non-Oil/Gas Manufacturing Industry, 1986-1996	152
4.16	Support from Parent Firms through Subcontracting Linkages in Indonesia's Machinery Industry	161
5.1	Profile of 96 Sample SMEs in 1998	175

5.2	Main Problems of Sample Firms at the Initial Stage and at the Present	176
5.3	Basic Characteristics of Related Subsectors	183
5.4	Changes in Output of Related Subsectors	184
6.1	Channels and Effectiveness of Technology Support Mechanisms for SMEs	195
6.2	Channels and Effectiveness of Marketing Support Mechanisms for SMEs	206
6.3	Channels and Effectiveness of Financing Support Mechanisms for SMEs	210
6.4	Main Findings: Support Mechanisms for SME Development in Indonesia	215
7.1	Profile of 60 Sample SMEs in 1998	225
7.2	Average Labour Productivity, Average Capital-Labour Ratio and Average Subcontracting Ratio by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector in 1993, 1996 and 1998 (Current Prices)	227
7.3	Average Annual Wages, Average Income Share of Labour and Average Rate of Returns to Capital by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector in 1998	229
7.4	Estimation Results of Production Functions and Subcontracting Ratio Function in 1998	237
7.5	Estimation Results of Production Functions and Subcontracting Ratio Function (1998 constant prices) in 1996 and 1993	243
7.6	Comparison of Index of Total Factor Productivity (TFP) over time in 1993, 1996 and 1998	248

7.7	Comparison of Indices of Total Factor Productivity (TFP) and Indices of Contribution of Subcontracting to TFP by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector in 1993, 1996 and 1998	248
8.1	Description of Items Listed in Motivations, Benefits, Costs and Linkage Types: Subcontracting with Large-scale Parent Firms	258
8.2	Profile of 73 Sample SMEs in 1998	262
8.3	Motivations for Subcontracting Transactions with Parent Firms	265
8.4	Matrix of Factor Loadings: Motivations for Subcontracting Transactions with Parent Firms	270
8.5	Intermediary Channels for the Commencement of Subcontracting Business with Main Parent Firms	272
8.6	Types and Utilisation of Subcontracting Linkages	276
8.7	Costs of Subcontracting Transactions with Parent Firms	287
8.8	Matrix of Factor Loadings: Costs of Subcontracting Transactions with Parent Firms	293
8.9	Revealed Benefits from Subcontracting Transactions with Parent Firms	295
8.10	Matrix of Factor Loadings: Revealed Benefits from Subcontracting Transactions with Parent Firms	301
8.11	Effects of Elements on the Overall Benefits from and Technical and Marketing Support through Subcontracting Transactions with Parent Firms	304

8.12	Discriminant Analysis: Effects of Elements on Technical and Marketing Support through Subcontracting Transactions with Parent Firms	309
9.1	Description of Items Listed in Motivations, Benefits, Costs and Linkage Types: Subcontracting Transactions with SMEs	318
9.2	Profile of 15 Sample Assembler Firms in 1998	322
9.3	Motivations for Subcontracting Transactions with SMEs	324
9.4	Types of Subcontracting Linkages with Local and Foreign-affiliated SMEs	329
9.5	Costs of Subcontracting Transactions with SMEs	336
9.6	Revealed Benefits from Subcontracting Transactions with SMEs	341
9.7	Matrix of Factor Loadings: Revealed Benefits from Subcontracting Transactions with Local SMEs	345
9.8	Matrix of Factor Loadings: Revealed Benefits from Subcontracting Transactions with Foreign-affiliated SMEs	346
9.9	Cost-Benefit Balance of Subcontracting Transactions with SMEs	348
9.10	Willingness to Utilise SMEs in Subcontracting Transactions in the Future	349
9.11	Efforts to Support SMEs in the Past and in the Future	351

List of Figures

2.1	Advantages and Disadvantages of Vertical Production Systems	31
3.1	Changes in the Share of Value Added by Industry: LEs and SMEs in the Japanese Manufacturing Industry, 1955-1985	75
3.2	Structure of Multi-layer Subcontracting Networks in Japan: An Automobile Assembler Firm in 1977	86
3.3	Assistance Extended by Large Parent Firms to Small-Medium Subcontractors in the Japanese Manufacturing Industry in 1977	92
3.4	Sources of Technologies for SMEs in Japan in 1984	92
3.5	Development of Subcontracting Systems in Japan	105
4.1	GDP per capita in Indonesia, 1965-2000 (1983 Rupiah)	111
8.1	An Example of Subcontracting Chains in the Indonesian Automobile and Motorcycle Industry	263

Glossary and Abbreviations

ADB	Asian Development Bank
AIPI	Association of Indonesian Bicycle Industry
ANOVA	univariate analysis of variance
APEC	Asia-Pacific Economic Cooperation
APIKS	Association of Small-scale Metalworking Industries in Sukabumi
APLINDO	Association of Indonesian Metal Foundry
ASPEP	Association of Metalworks and Machinery
Bapak Angkat	foster-father program
BIPIK	small industries development program
BPS	Central Bureau of Statistics (currently Statistics Indonesia)
BRI	Bank Rakyat Indonesia (Indonesian People's Bank)
BUMN	state-owned enterprises (SOEs)
FDI	foreign direct investment
GAIKINDO	Association of Indonesian Car Manufacturers
GAMMA	Federation of Associations of Indonesian Metalworks and Machinery Industries
GIAMM	Indonesian Automotive Parts and Components Industry Association
IEDB	International Economic Data Bank
ILO	International Labour Organization

IMF	International Monetary Fund
ISIC	International Standard Industrial Classification
ISO	international standard developed by International Organization for Standardization
JABOTABEK	greater Jakarta area consisting of the cities Jakarta, Bogor, Tanggerang and Bekasi
JICA	Japan International Cooperation Agency
JIT	just-in-time system
JSBRI	Japan Small Business Research Institute
KADIN	Indonesian Chamber of Commerce and Industry
KADINDA	Regional Chambers of Commerce and Industry
KIK	credit for small investment
KMKP	credit for working capital
KUK	credit for small businesses
LE(s)	large-scale enterprises
MANOVA	multivariate analysis of variance
MITI	Ministry of International Trade and Industry, Japan (currently METI or Ministry of Economy, Trade and Industry)
MOCSME	State Ministry of Cooperatives and Small & Medium Enterprises, Indonesia
MOIT	Ministry of Industry and Trade, Indonesia
NAFED	National Agency for Export Development, Ministry of Industry and Trade, Indonesia
NGO(s)	non-governmental organisations
OCR	obligational contractual relations

OEM	original equipment manufacture
OLS	ordinary least squares method
PASMI	Association of Indonesian Motorcycle Assemblers and Manufacturers
PIK	small industrial estates
PIKM	small-scale enterprises development project
PMA	foreign-affiliated firms
QC	quality control
QCD	quality, cost and delivery time
QS-9000	international quality system required by International Automotive Sector Group
R&D	research and development
RCA(s)	revealed comparative advantage(s)
Repelita	Five-year Development Plan in Indonesia
SBU	strategic business units of BRI
SITC	Standard International Trade Classification
SME(s)	small- and medium-scale enterprises
TFP	total factor productivity
TPL(s)	extension field officer(s)
TPM	Total Productive Maintenance
TPS	Toyota Production System
2SLS	two-stage least squares method
UNIDO	United Nations Industrial Development Organization
UPT(s)	technical service unit(s)

Chapter 1

Introduction

In 1994, the author had a chance to visit several small- and medium-scale enterprises (SMEs) producing metalworking and machinery goods in Jakarta and its surrounding areas. Most of the observed firms supplied their products to large-scale enterprises (LEs) in the machinery industry. Those metalworking and machinery SMEs did not have state-of-the-art equipment and technologies, and their shop floors were commonly hot, dusty, greasy and disorderly. However, they looked very energetic and entrepreneurial. This scene in 1990s Indonesia brought to mind the 1960s Kawaguchi city in Saitama and Ota ward in Tokyo, which are famous in Japan for their small-medium foundries and machinery producers. A great number of metalworking and machinery SMEs in these districts were dynamically expanding their production through subcontracting transactions with LEs during the era of high economic growth. We realised from our day-to-day life in the 1960s how these subcontracting SMEs had firmly underpinned Japan's industrial and economic development. These experiences in Indonesia and Japan motivated the author to examine whether Indonesian SMEs have taken an important role in economic development and whether subcontracting ties with LEs are beneficial to SME development in Indonesia.

1.1 Economic Development, SMEs and Subcontracting in Indonesia at Present

Many factors contribute to economic development in developing economies, but according to Levy, Berry and Nugent (1999: 1), there is no doubt that the performance of SMEs is extremely important for the economic development of most less-developed countries. They attributed the importance to well-recognised advantages of SMEs such as employment generation, income growth, entrepreneurial training, technical and allocative efficiency, lower degree of wage inequality and greater flexibility during changing economic conditions.

How relevant are SMEs as factors in the economic development of Indonesia? Hill (2001: 248-50) explained that SMEs in Indonesia have become focal points of study for the following reasons:

(1) the significant contribution of SMEs to the economy (e.g., workforce and output);
(2) high priority to SME development given by the Indonesian government with the aim of improving efficiency and achieving welfare goals in the context of economic development;
(3) the potential role of SMEs in promoting *pribumi* (indigenous Indonesian) enterprises that have lagged behind non-*pribumi* (ethnic Chinese) counterparts in business development;
(4) the need to formulate economic policies different from those for large-scale enterprises (LEs), because of SME-specific characteristics such as higher concentration on particular industrial activities, lower concentration in major urban centres and lower foreign ownerships;

(5) the expected role of SMEs in promoting industrialisation; and

(6) the better response of SMEs to the 1997-98 crisis, relative to LEs.

In 1997, SMEs (defined as manufacturing firms with less than 300 employees) in Indonesia employed 72 percent of the industrial workforce and generated 32 percent of industrial gross output. SMEs therefore account for a significant portion in the Indonesian economy.

Since the country's independence in 1949, all governments in Indonesia have paid special attention to SME development. Support for and promotion of SMEs are key public policies in the Five-Year Development Plans (Repelita) and other government documents (Hill 2001: 248-9). SME policies have been dealt with by not one but two ministries: the Ministry of Industry and Trade (MOIT) and the State Ministry of Cooperatives and Small & Medium Enterprises (MOCSME). These policy stances and organisational arrangements imply how important SME development is for the Indonesian government.

In Indonesia, the development of SMEs is perceived to contribute to the improvement of income distribution and the promotion of economic activities undertaken by economically weak groups, particularly *pribumi* (indigenous Indonesian) people. The dominant role of non-*pribumi* (mainly ethnic Chinese) entrepreneurs in most of the manufacturing sector continues and significant differences in business power between *pribumi* and non-*pribumi* firms have not disappeared (Braadbaart 1994: 21-3; Hill 1997: 6; van Diermen 1997: 2).[1] The Indonesian government expects to reduce this imbalance of economic power between *pribumi* and non-*pribumi* enterprises, a politically and socially important issue, by developing SMEs.

---

[1] Possible reasons for this are, for example, inadequate SME policies implemented by the government and passive response of *pribumi* firms to the public policies and market signals (Mizuno 1996: 20-7).

SMEs often require public policies that are different from policies dealing with large-scale enterprises, because the former group has specific features (Hill 2001: 249). For example, SMEs tend to concentrate on particular industrial subsectors or activities such as food processing, garments, wood furniture, metalworking and machinery, which are different from those engaged in by LEs. The SME sector is generally less concentrated in major urban centres and is more closely linked to the local economy than the LE sector. Relative to large-scale firms, small-medium firms are likely to be less foreign- or government-owned. In addition, due to reasons such as insufficient internal resources, SMEs usually face difficulties that are different from those of LEs.[2]

With reference to international experience, Hill (2001: 249) pointed out a possible contribution of an efficient SME sector to rapid industrial development and a flexible industrial structure. In Repelita VI (1994/95-1998/99), the Indonesian government put the strong emphasis on promoting SMEs for the purpose of rapid industrialisation and economic development.

It has recently been said that SMEs in Indonesia weathered the 1997-98 economic crisis better than LEs (Hill 2001: 250). This flexible feature during the drastically changing economic conditions attracted attention to the SME sector in Indonesia.

All the above descriptions exemplified Hill's six reasons why the development of SMEs is a focal issue in the Indonesian economy. Such great interest in SME development in Indonesia enhances the relevance of questions regarding the factors that help SMEs without sufficient internal resources perform well and the ways in which they can be assisted to overcome their difficulties and improve their capabilities. As

[2] See, for example, Berry, Rodriguez and Sandee (2001: 363). In developing economies, LEs can increase productivity, by simply borrowing advanced technologies in the world through several sources such as foreign direct investment (FDI), technology licensing and joint ventures. These channels are easily available to LEs, but not SMEs. It is therefore difficult for SMEs to find sources for technologies and acquire them.

will be discussed in Chapter 2, SMEs cannot necessarily play the roles they are expected to play in economic development. Internal constraints such as insufficient technological, managerial, marketing and financing capabilities often prevent SMEs from fulfilling potential advantages.

Levy, Berry and Nugent (1999: 17-8) stated that some of these technological, marketing and financial problems which are special to SMEs can be alleviated or resolved through mutually beneficial linkages with LEs, particularly subcontracting. They explained that:

(1) subcontracting raises the efficiency of the manufacturing industry as a whole by distributing functions to the firms best able to undertake them;
(2) subcontracting increases the labour intensity of the industries involved since SMEs tend to operate in more labour intensive ways than LEs do; and
(3) subcontracting contributes to the healthy development of certain types of SMEs.

The authors maintained that, although subcontracting may in some cases be an indirect form of labour exploitation, it is generally beneficial to SME development in developing economies from the perspectives of both efficiency-growth and social equality.

A recent study by Berry, Rodriguez and Sandee (2001) discussed SME development in Indonesia before and during the 1997-98 economic crisis. It found that, although absolute levels of labour productivity in most SMEs that had only limited internal resources remained low, productivity of SMEs had risen over the past few decades and those growth rates were not far from those of LEs. The authors hypothesised that subcontracting arrangements would be one of the possible sources of productivity increases for Indonesian SMEs which faced the lack of technological and other capabilities.

The issue of SMEs and subcontracting in Indonesia has been discussed in several studies, which will be referred to in Chapter 4. However, most of these existing studies have not examined the development of SMEs through subcontracting in any comprehensive way. Therefore, the roles and mechanisms of subcontracting in SME development have not clearly been elucidated in Indonesia.

Compared with Indonesia's small accumulation of research on subcontracting and SME development, Japan's historical experience with SME development through subcontracting has been studied at length. Japan's historical experience may be helpful in understanding the current situation in Indonesia. As will be examined in detail in Chapter 3, there were few capable SMEs in Japan, when subcontracting transactions between SMEs and LEs in the machinery industry were initiated in the 1930s and resumed in the 1950s. This situation seems similar to Indonesia at present.[3] The establishment and resumption of subcontracting systems in the Japanese machinery industry in the 1930s and the 1950s were respectively encouraged by the rapid expansion of demand under the economic conditions where capital was relatively scarce, market growth was unpredictable, wage gaps between LEs and SMEs were substantial, and infrastructure and technology developed steadily. These circumstances in Japan seem similar to those in Indonesia at present.

Subcontracting in the Japanese machinery industry between the 1930s and the 1970s generally linked SMEs to local large-scale assembler firms, rather than to foreign firms. This is dissimilar to subcontracting in smaller East Asian economies such as

[3] This is, on the other hand, different from the United States, where capable machine parts producers already existed at the time of the development of machine tools and automobile industries in the late nineteenth and the early twentieth centuries (Odaka 1978: 248; 1985: 390-1).

Taiwan, where local SMEs tend to be linked to foreign customers or markets. Indonesia resembles the Japanese situation more.

Reflecting all the discussions above, this study chooses the performance of SMEs out of many possible factors that stimulate economic development for developing economies and investigates elements that promote the development of SMEs in Indonesia. Specifically, this study will examine SME development through subcontracting in Indonesia in a comprehensive way, with reference to Japan's historical experience. In doing so, it is of course necessary to appreciate the differences in the economic, social and cultural context in which subcontracting systems involving SMEs evolved in Indonesia and Japan in the past.

1.2 Japan's Experience with Economic Development, SMEs and Subcontracting

Japan developed rapidly from a feudal, inward-looking country in the mid-nineteenth century to a highly industrialised, outward-looking country at the end of the twentieth century. Many scholars have elaborated the reasons why Japan, an Asian and non-Western country, was able to achieve this transformation in a relatively short period (e.g., Denison and Chung 1976; Kelley and Williamson 1974; Lockwood 1965; Ohkawa and Rosovsky 1973; Pilat 1994). Japan's economic development has often been contrasted with that of other developed economies (e.g., Landes 1965; Pilat 1993). In contrast, Ohkawa and his colleagues analysed economic development in Japan in the past with the aim of comparing it with that of developing economies at present, in an effort to uncover similarities (e.g., Ohkawa 1976; Ohkawa 1993; Ohkawa and Kohama 1989; Ohkawa and Ranis 1985).

In their analysis of economic development in Japan until the early 1970s, Ohkawa and his colleagues identified the role of small- and medium-scale enterprises as one of the key factors (e.g., Hondai 1992; Motai and Ohkawa 1978; Ohkawa 1976: 149-66; Ohkawa and Kohama 1989: 105-15, 136-51; Ohkawa and Tajima 1976; Tajima 1978). Japanese SMEs employed the dominant share of manufacturing workforce and linked the traditional economic sector to the modern and industrialised sector.[4] Ohkawa and Tajima (1976: 32-3) and Tajima (1978: 27) found that SMEs in Japan coexisted with large-scale enterprises and contributed to employment creation and industrialisation.[5]

What factors enabled Japanese SMEs to play such a significant role in economic development? SME development in Japan has often been attributed to subcontracting relationships between SMEs and LEs. For instance, Ohkawa and Kohama (1989: 150) argued that subcontracting arrangements in Japan, particularly in the machinery industry, diffused new or improved technological knowledge to SMEs more directly and quickly than any other arrangements. They emphasised the important role of subcontracting as an organisational device in alleviating shortcomings in the technological and other capabilities of SMEs.

Japan's experience with SMEs is an important inspiration for this study. It will provide a reference for examining: 1) whether SMEs have the potential to contribute in any significant way to economic development, despite the fact that they often lack

---

[4] In general, the traditional sector relies on indigenous technology and organisation and adopts production methods of labour intensity, while the modern sector depends on imported Western technology and organisation and employs production technique of capital intensity. Small-scale family farming under the traditional landlordism and cottage industries run by artisans and craftsmen are a typical example of the former group. Large-scale cotton-spinning factories with machinery and wageworkers are a clear example of the latter group (Ohkawa and Kohama 1989: 23-7; Ohkawa and Rosovsky 1973: 12).

[5] According to the results of their comparative studies, similar to those in Japan, SMEs in several of the observed developing countries basically satisfied necessary conditions for the coexistence with LEs. This implies that the SME sector in such developing economies also can play a certain role in economic development.

sufficient internal resources to achieve it; and 2) whether subcontracting can give an impetus to the development of SMEs in a developing economy like Indonesia.

1.3 Purpose and Approach of the Study

This study has three main objectives. The first is to review the development of Japanese SMEs particularly in the machinery industry through subcontracting linkages between the 1930s and the 1970s and extract the essence of Japan's historical experience for comparison with SME development in Indonesia at present.

The second objective, which is the central one of the three, is to examine in detail the development of SMEs especially in the machinery industry and the roles and characteristics of subcontracting linkages in this sector in contemporary Indonesia. As explained before, some work has been done in this field, which will be discussed in Chapter 4, but the role of subcontracting in the development of Indonesian SMEs has not necessarily been elaborated in a satisfactory manner. Therefore, the key discussions for this second purpose are whether and how SMEs have contributed to economic development in Indonesia, how and why subcontracting linkages between SMEs and LEs have been (or have not been) established and developed in Indonesia, and whether and how subcontracting can be beneficial to SME development in Indonesia.

The third purpose is to identify similarities and differences in the development of SMEs and subcontracting systems between Indonesia at present and Japan in the past. Based on the comparison of the roles of subcontracting between Indonesia at present and Japan in the past, the study draws implications of our micro-level evidence for the degree of generalisation of SME development through subcontracting in Indonesia.

What approach should this study adopt for these purposes? An analysis based on manufacturing statistical data published by the Indonesian statistical office can draw a general picture of SME development in Indonesia, but does not allow the study of subcontracting and SME development in any detail. The available data and literature have not provided us with sufficient information on the nature of subcontracting linkages for SMEs in Indonesia.

To overcome these shortcomings of the existing data and information, this study is based on a firm-level survey, using a questionnaire and interview survey method. For the second purpose in particular, the results of an intensive firm-level survey in Indonesia will be used. This firm-visit survey aimed to collect a set of microeconomic data on production and organisational arrangements which is not covered by the published available information. Micro-level evidence based on such firm-level observations allows this study to examine in detail SME development through subcontracting in Indonesia.

1.4 Structure of the Study

After this introduction, Chapter 2 establishes the framework of the study, which reviews the roles of SMEs in economic development, presents theoretical accounts for subcontracting in the context of SME development, and raises the main research questions that this study addresses.

Chapter 3 looks into the development of SMEs and subcontracting systems in Japan since the early twentieth century, with particular attention to the machinery industry. It confirms that subcontracting relationships in Japan functioned as support mechanisms for SMEs and that they improved production efficiency of SMEs. This chapter establishes the essence of Japan's historical experience with SME development and subcontracting.

Chapter 4 provides a broad overview of the development of SMEs in the Indonesian economy. Starting with a digest of the development of the Indonesian economy, manufacturing industry and SMEs, it calculates several indicators and productivity growth by firm size based on national-level statistical data with the aim of examining whether SMEs can coexist with LEs and whether they have improved production efficiency. This chapter also reviews subcontracting systems in Indonesia, on the basis of available literature.

Four chapters that analyse the data and information obtained from our firm-level interview and questionnaire survey follow an explanation on the methods of micro-level survey and main characteristics of the sample firms and subsectors in Chapter 5. Chapter 6 confirms the importance of subcontracting linkages in Indonesia. It investigates what kind of external sources metalworking and machinery SMEs have used as support mechanisms. Based on the results of an interview survey with 93 sample SMEs, it also establishes how useful such sources are for SMEs in developing their technological, marketing and financing capabilities.

Chapter 7 examines in a quantitative way whether subcontracting linkages with LEs enable SMEs to improve their productivity. This chapter estimates production functions and calculates indices of total factor productivity (TFP), based on micro-level data from 60 metalworking and machinery SMEs.

Chapter 8 explains how and why subcontracting linkages can be crucial to SME development. It draws on qualitative data from a survey among 73 metalworking and machinery SMEs. It employs a discriminant analysis to investigate the elements for the better functioning of subcontracting linkages, after looking at the motivations for and initiation of subcontracting business with parent firms, types of subcontracting linkages, and costs of and benefits from subcontracting transactions.

Chapter 9 explores the detailed characteristics of subcontracting ties in the Indonesian machinery industry from the perspective of large-scale parent firms. Based on qualitative data from a survey among large assembler firms, the chapter examines whether subcontracting systems have built-in support mechanisms for SME development.

Chapter 10 summarises the main findings on SMEs and subcontracting in this study. Taking account of similarities and differences between Japan in the past and Indonesia at present, it will reiterate the development of SMEs and the roles of subcontracting in the Indonesian machinery industry and discuss some implications of our micro-level empirical work for more general issues on SME development through subcontracting in Indonesia.

Chapter 2

Framework of the Study

2.1 Introduction

This chapter constructs a conceptual framework for the study of small- and medium-scale enterprises (SMEs) and subcontracting linkages in developing economies, which will provide an analytical basis for the rest of this study. The framework will help explain how and why SMEs are important in the process of economic development and how and why subcontracting systems are helpful to the development of such SMEs.

In this chapter, Section 2.2 explores the roles of SMEs in economic development and industrialisation, particularly in developing economies. Section 2.3 presents the theoretical foundations of this study. It examines the reasons why subcontracting arrangements are, under certain conditions, a suitable way of structuring vertical production systems in developing economies. This section also looks into the nature, benefits and motivations of subcontracting transactions, the basic conditions under which subcontracting can flourish, and the types of subcontracting linkages that promote SME development. Based on the analytical framework, Section 2.4 raises seven research questions concerning SMEs and subcontracting systems in Indonesia at present and Japan in the past.

2.2 Roles of SMEs in Economic Development

This study focuses on SMEs and subcontracting linkages in the context of economic development. The following questions may help understand the basic characteristics of SMEs: 1) What kind of advantages can SMEs provide to developing economies?; 2) What kind of difficulties or constraints prevent SMEs in LDCs from realising their potential roles in economic development?; and 3) Can SMEs play different roles in different situations? These questions will be addressed in subsequent subsections.

2.2.1 Contributions of SMEs in Developing Economies

Several studies have already demonstrated that SMEs have played various important roles in the successful development of many developing economies (e.g., Abdullah 2000: 4-6; Berry and Mazumdar 1991: 35-9; Little, Mazumdar and Page 1987: 8-21; Odaka 1981: 169-70; Ohkawa 1976: 149-66; Park 1995; Staley and Morse 1965: 190-223). They list the following reasons: 1) the high share of SMEs in economies in terms of the number of establishments, number of employees, value of output, etc.; 2) the contribution of SMEs to the favourable combination and utilisation of production factors (i.e., labour and capital) through the adoption of technologies appropriate to resource endowments and through the participation in an inter-firm division of labour; 3) the contribution of SMEs to the establishment of foundations for industrialisation;[1] 4) the contribution of SMEs to exports; 5) the contribution of SMEs to a more equal

[1] As will be explained later in this chapter, SMEs can often contribute to the foundations of industrialisation because they complement the roles of LEs. For example, parts and components for machinery tend to be produced by SMEs, while LEs often engage in assembling operations. Thus, without the supply of intermediate goods from SMEs, it is difficult for LEs to manufacture final goods. Also, in general, many LEs were SMEs when they started operations.

income distribution as a consequence of their relatively larger share in labour earnings; and 6) flexible response of SMEs to changing economic conditions.

These six aspects will be explained below. However, the roles of SMEs in economic development vary according to the type of economy, stage of economic development and sector of industry (Little 1988: 7; Berry and Mazumdar 1991: 35). Staley and Morse (1965: 227-8) specifically pointed out the following five elements that may influence the development of SMEs: 1) resource endowments; 2) size of the domestic market; 3) average income level of consumers in domestic markets; 4) existing industrial base; and 5) political and social institutions. For example, SMEs in countries with abundant unskilled labour, much underemployment/unemployment and limited capital resources tend to use simpler and more labour-intensive technologies than those in countries with opposite conditions. Relative to SMEs in small countries, those in large countries may have a larger domestic market and may be more inward-looking. SMEs in countries with a low per capita income are likely to produce lower-end and less value added products than those in countries with a higher per capita income. Economies with a flourishing manufacturing sector, better industrial infrastructure, and an open and democratic society may encourage SMEs more successfully to engage in higher value added operations.

While acknowledging the above differences and variations, this subsection surveys the available literature on how SMEs, in general, can contribute to economic development. Such insights form a useful base for the development of an analytical framework in the next section of this chapter. As mentioned above, the following are five positive aspects of SMEs in economic development.

Significant portion in economies

Table 2.1 shows the share of SMEs in several East Asian countries including Indonesia, in terms of the numbers of establishments and workers, and value added in the mid-1990s.[2] SMEs constitute at least 85 percent of all manufacturing establishments, while they employ between 30 percent and 80 percent of the manufacturing workforce. Particularly in Taiwan, Indonesia, Japan and Korea, SMEs employ 70-80 percent of manufacturing workers. The contribution of SMEs is somewhere between 25 and 55 percent of total manufacturing output. These data indicate that with some differences, the significant portion of SMEs in economies is a common feature of the East Asian countries.

Based on time series data on the size distribution of manufacturing in Singapore, Hill (1997: 276-8) illustrated that the share of SMEs with 100-299 workers in the economy increased after 1975 and that of SMEs with 10-99 workers decreased. During 1975-92, SMEs as a whole in Singapore accounted for, without significant changes, roughly 95 percent of establishments, 50 percent of employment and 40 percent of value added. The SME sector in Singapore, particularly larger SMEs, continued to occupy an important part of the economy over the course of industrialisation. According to Hill (1997: 278-9), this trend was also supported by evidence from other East Asian countries including Japan and Indonesia.[3] In East Asia, SMEs tend to account for a considerable portion of economies regardless of the stage of development within respective countries.

---

[2] Different definitions of SMEs and weak databases for SMEs do not allow the use of a uniform setting in the analysis. In Table 2.1, firms with up to 299 workers are SMEs in Indonesia, Japan, Korea, Singapore and Thailand, while firms with 199 or less workers are SMEs in Taiwan, Malaysia and the Philippines. The data for Japan, Korea and Singapore do not include micro- or cottage-level SMEs with less than 4 or 5 or 10 workers.

[3] In Indonesia, when firms were classified by size in the initial year, the share of SMEs in value added has been expanding since the mid-1980s. This will be discussed in Chapter 4 of this study. For Further details, see Aswicahyono, Bird and Hill (1996: 353-4).

Table 2.1 Share of SMEs in the Manufacturing Industry: East Asian Countries

Countries/Firm Size [1]	*Number of Firms* (%)	*Employment* (%)	*Output* (%) [2]
Indonesia (1996)			
1 - 19	99.2	61.2	10.7
20 - 99	0.6	5.6	5.9
100 - 299	0.1	5.9	10.7
SMEs (<300)	99.9	72.7	27.3
Japan (1996)			
4 - 19	73.9	22.1	12.2
20 - 99	21.9	31.2	23.5
100 - 299	3.2	18.6	19.5
SMEs (4-299)	99.0	71.9	55.2
Korea (1996)			
5 - 49	90.7	40.6	21.9
50 - 299	8.4	28.6	25.3
SMEs (5-299)	99.1	69.2	47.2
Taiwan (1996)			
SMEs (<200)	98.0	79.0	34.4
Singapore (1995)			
10 - 19	40.8	5.2	2.7
20 - 99	42.5	20.7	13.0
100 - 299	11.4	20.5	18.1
SMEs (10-299)	94.7	46.4	33.8
Thailand (1996)			
1 - 49	87.8	21.9	-
50 - 99	5.1	9.7	-
100 - 299	4.8	20.8	-
SMEs (<300)	97.7	52.4	-
Malaysia (1994)			
1 - 19	24.0	1.8	0.9
20 - 99	44.4	14.7	11.6
100 - 199	16.1	15.1	13.9
SMEs (<200)	84.5	31.6	26.4
Philippines (1994)			
1 - 9	88.4	24.3	4.4
10 - 99	9.8	18.1	10.7
100 - 199	0.8	8.9	11.6
SMEs (<200)	99.0	51.3	26.7

Notes: 1) Firm size is indicated in terms of the number of employees.
2) Output in Taiwan is in terms of sales, while that in other economies is value added.

Sources: Indonesia: Table 4.13 in Chapter 4; Japan: Small and Medium Enterprise Agency, MITI (2000); Korea: JSBRI (1999a); Taiwan: JSBRI (1999b); Singapore and Malaysia: JSBRI (1998); Thailand: JSBRI (1999c); Philippines: Fukumoto (1999).

Favourable combination and utilisation of production factors

The SME sector in developing economies has often been affected adversely by distortions in factor markets, where the price of capital for large-scale enterprises (LEs) tends to be lower than its true opportunity cost, while wage levels in LEs are generally higher due to factors such as government legislation and trade union activities (Mazumdar 2001: 3-4). On the basis of their extensive analysis of postwar Japan, Ohkawa and Tajima (1976) and Tajima (1978) suggested that, under such factor market conditions, SMEs can coexist with LEs by choosing labour-intensive technology and achieving high capital productivity.

Hill (1983) found in his study of Indonesian cambric producers that, in contrast to larger-scale producers who had access to credit at lower interest rates, smaller-scale producers had to rely on the informal credit sector where interest rates were higher. They therefore tended to select less capital-intensive and more labour-intensive techniques from the wide range of available weaving technologies. These findings indicate that the greater labour intensity of SMEs is appropriate for developing economies with a scarcity of capital and a more plentiful supply of labour, and that labour-intensive SME operations result in the improvement of the productive efficiency.[4] In his empirical study of Japan's machinery industry, Hondai (1992) also observed that contracting-out by LEs to SMEs in the 1930s resulted in an increase in the efficiency of capital through the substitution of material inputs for capital, while contracting-out in the 1960s reduced the labour cost of LEs through the substitution of material inputs for labour.

---

[4] Not only SMEs but also LEs can be labour-intensive. Depending on the circumstances, LEs in, for example, electronics and garment industries, engage in labour-intensive operations.

Foundations for industrialisation

According to Odaka (1981: 169-70) and Takeuchi (1991), before World War II Japanese SMEs had a catalytic function in linking traditional to modern industries, whereas after the war many SMEs grew and became viable medium-scale enterprises, which widely diffused advanced technologies in the domestic manufacturing industry. JICA studies (1995 and 1997) on industrial development in Thailand and Indonesia observed that machinery SMEs forged more intense forward and backward linkages with LEs, which contributed to the strengthening and deepening of the industrial base of these economies.

In general, modern manufacturing industry needs to have supporting industries to produce intermediate goods and parts/components, many of which are usually produced by SMEs. Modern upstream sectors such as the iron and steel industry need to have a downstream market large enough to absorb their products.

SMEs are an important part of the industry groups that demand such basic materials. Abdullah (2000: 5) pointed out that SMEs often serve as schools for developing the skills of workers and entrepreneurs. Through learning-by-doing, workers and entrepreneurs in the SME sector acquire experiences and improve their industrial skills and knowledge. In all these ways, SMEs can contribute to the establishment of the foundations for industrialisation in developing economies.

Export Promotion

It is possible for SMEs to contribute to the expansion of exports, although LEs tend to be more export-oriented. For example, Takeuchi (1991) discussed cases of Japanese SMEs in bicycle, knit-fabric, shell-button and brush industries between the late nineteenth century and the mid-twentieth century. SMEs played a key role in the production of export goods in these labour-intensive sectors. They could be competitive in international markets through the development and use of labour-intensive technologies.

SMEs in Taiwan with only a limited size of domestic markets have been very export-oriented since the early 1960s and continuously accounted for 50-60 percent of total exports in the 1990s (Japan Small Business Research Institute 1999b: 10, 16-7, 60-1). Taiwanese SMEs have shifted their main export items from traditional products (e.g., bicycles, electric fans, footwear and umbrellas) until the 1980s, to high-tech products (e.g., computers and computer parts/accessories) in the 1990s.

Hayami, Kikuchi and Marciano (1998) observed cottage manufacturers and rural factories for metal craft goods in the Philippines, which recently expanded the production of ornaments, gifts and toys for export through export contractors located in Greater Manila. Similarly, in Indonesia, Bali's garment and Jepara's furniture manufacturers are outstanding examples of SME exporters, both of which have remarkably increased their exports since the 1980s, taking advantage of indigenous design capacity, local raw materials and foreigners as marketing and technical helpers (Berry and Levy 1999; Cole 1998; Sandee, Andadari and Sulandjari 2000).

More equal distribution of income

Substantial differences in average wages between SMEs and LEs are a common feature of labour surplus developing economies. For example, in the Indian textile and sugar industries, wages of workers employed in SMEs were significantly lower than those of workers in LEs (Little, Mazumdar and Page 1987: 33-57). As Berry and Mazumdar (1991: 37-8) stated, these wage differences between SMEs and LEs imply that, when the former group generates a larger share of total output, more of the income accruing to labour is likely to go to the lower wage groups. Tambunan (2000: 45-60) found that SMEs in agriculture-based industrial activities in Indonesia have served as a last resort for people with low educational levels and for poor farm households in rural areas. These observations suggest that SME development contributes to a reduction in income inequality in a country. This effect is a reason for policy makers to promote the development of SMEs.[5]

In addition to income distribution, SMEs have a potential role in improving spatial distribution. For example, in China, rural SMEs in the form of township and village enterprises (TVEs) have been a main force of the rapidly growing manufacturing industry after 1978, and this phenomenon has significantly promoted more equitable regional development between urban and rural areas (Otsuka 1998: 448; Shaolian 2000).

Flexibility in changing economic environments

SMEs can sometimes adapt better to changing economic circumstances than LEs (Berry, Rodriguez and Sandee 2001: 363-4). Because of their smaller workforce and their poorer production facilities, SMEs are generally able to adjust their production volume and diversify product lines according to changes in demand with less negative impact on the existing production structure. They tend to produce day-to-day necessities rather than luxuries, by using domestic input materials. They are not likely to rely heavily on short-term loans from the modern financial sector (Hill 2001: 264).

Under sharp economic downturns such as the 1997-98 economic crisis, these factors enable SMEs to be more flexible in changing their production structure to suit

[5] The argument relating to the impact of SME development on income distribution tends to be discussed more frequently than the argument of the efficiency related to distortions in the labour market, because differences in the level of efficiency wages between SMEs and LEs are not likely to be significant, compared to those of average wages. For further details, see Berry and Mazumdar (1991: 37-8).

market demand. Tambunan (2000: 148-51) described how, during the recent economic crisis, Indonesian SMEs including food, wood, rattan and leather producers, have been less adversely affected or even, in some cases, positively affected, because they generate manufactured necessities for both domestic and foreign markets based largely on local resources. In addition, Tambunan stated that inward-looking metalworking SMEs have been able to benefit from the economic crisis by quickly shifting their product lines to nails, latches, door bolts, spades, hoes and rubbish bins.[6]

2.2.2 Growth Constraints for SMEs in Developing Economies

Although SMEs may have the potential advantages mentioned above, SMEs cannot always fully realise such potential contributions to industrialisation and economic development. Many studies have indicated the reasons why SMEs may fail to do so. The reasons may depend on factors such as size, age, ethnic affiliation and subsector of SMEs, but are often similar in developing economies. Insufficient entrepreneurial and managerial skills are typical internal constraints to SME growth, while limited access to technologies, markets, input materials and credit and government policies in favour of LEs are common external constraints (Schmitz 1982: 430-41). Berry and Mazumdar (1991: 54-8) stated that many SMEs in Asian developing economies have suffered from insufficient capabilities in technology, management, marketing and financing and from a lack of access to effective support systems.

The following experiences of individual countries in East Asia are consistent with the common and sometimes inherent impediments to the growth and performance

[6] The shift to the production of these items has been encouraged by the increasing demand for cheaper domestic products instead of expensive imported ones, due to the rupiah's depreciation. The demand for those products also appeared in response to the government-funded labour-intensive public work projects designed as relief work for the crisis (Tambunan 2000: 148-51).

of SMEs. Seong (1995) revealed that SMEs in Korea suffered from a lack of economies of scale, insufficient technical skills, insufficient access to formal financial institutions, inactive R & D activities, and limited access to international markets. Even in Taiwan, where the development of SMEs is generally considered as a successful case, Liao and Kao (1995) demonstrated that SMEs faced problems such as poor access to adequate credits, difficulties in acquisition of technologies, and inefficient management. SMEs in Thailand have encountered similar obstacles including insufficient access to necessary information, adequate equipment and adequate financing, in addition to the absence of effective standardisation of products (Park 1995: 167). In Malaysia, SMEs faced difficulties related to marketing, finance, skilled labour, raw materials, management, technology and competition (Chee 1986: 39-51).

As indicated above, SMEs tend to suffer from several common problems that impinge on their potentially positive impact on economies. In addition to broader issues such as a lack of scale economies and adverse effects of government policies, they have faced inadequate access to markets, raw materials, favourable credits, production technology and information. Furthermore, SMEs experienced problems of insufficient managerial and organisational capabilities. Developing economies, therefore, may have to relieve these constraints, if they wish to take advantage of the roles that SMEs can play in economic development.

2.2.3 SMEs in Developing Economies in Different Contexts

SMEs can contribute to economic development in different ways. For instance, cottage industries in remote areas can play an important role in reducing uneven regional distribution of income, whereas small-medium enterprises with technology and management skills may support the development of the LEs on which industrialisation depends.

According to Romijn (1987: 212-20), in Thailand cottage industries with less than 10 workers occupied more than 60 percent of total manufacturing establishments in 1980. The share of rural cottage industries in total manufacturing value added accounted for nearly one fifth in 1979. Given the heavy Bangkok bias in Thailand's industry, this figure is not necessarily low. For agricultural households, the share of income from cottage industries in total earnings accounted for 22 percent in 1978/79. The rural cottage sector also performed well as a foreign exchange earner. More than half of the handicrafts export value in the early 1980s was generated by rural cottage industries. Because of the highly seasonal nature of agriculture and the excessive concentration of business in Bangkok, the roles that cottage industries in rural Thailand have played in employment and income creation and export promotion seem quite important.

Hayami, Kikuchi and Marciano (1998: 151-3) illustrated the potential benefits of labour-intensive rural metal craft firms in the Philippines to improving the incomes and living standards of rural people, particularly those who are poor and landless. The small-scale metal craft producers suit the economic environment in the rural Philippines in terms of their small capital requirements and the significant creation of low-skilled employment. In addition, capable entrepreneurs have emerged from such rural metal craft producers, and, as a consequence of collaborative subcontracting linkages with urban export agents, they can take advantage of the business opportunities created by high economic growth in neighbouring NIEs and ASEAN countries since the late 1980s by exporting their products. In these cases, micro-scale SMEs in rural areas can contribute to mitigating income inequality and uneven geographical distribution of manufacturing activities in a way which conforms to local economic conditions in Thailand and the Philippines.

A common industrial organisation among small-medium manufacturing firms is clustering, where SMEs producing similar products concentrate in a certain area. This provides collective efficiency through local external economies and joint actions (Schmitz 1995: 530). According to Berry (1997: 7-8, 11), clustering in developing economies tends to emerge in micro-scale or cottage industries located in small towns and villages or in confined segments of large cities. The advantages of cooperation among SMEs in clusters are derived from: 1) economies of scale, for instance, purchases, sales, investment in common production facilities and infrastructure; 2) dissemination of information on technology and markets; and 3) division of labour.

In Indonesia, the agglomeration of manufacturing SMEs is often observed in both rural and urban areas (Berry, Rodriguez and Sandee 2001: 370-1). According to Weijland (1999: 1516-20), rural clusters in Indonesia have a seedbed function for the development of SMEs, demonstrating that clustering can improve for producers to markets, through dense networks of traders. These clusters can also reduce the transaction costs of purchasing inputs and marketing outputs, ease information flows, and facilitate order-sharing, labour-sharing, equipment- and skill-sharing and subcontracting.[7]

Micro-scale enterprises in the urban and rural informal sector of developing countries can play a positive role in socio-economic development.[8] The Asian

---

[7] There is evidence that clusters are of limited importance for SME development. In her study on a rural metal-casting cluster in Ceper of Central Java, Sato (2000a) found only limited intra-cluster linkages among neighbouring SMEs. In this cluster, most SMEs did not conduct collaborative activities such as specialisation, open information sharing, joint marketing and joint purchasing. She pointed out that SMEs can establish inter-firm linkages with firms not only inside but also outside the cluster, if the cluster is located in a convenient place in terms of transport, communication and trade intermediation.

[8] The informal sector is generally characterised by a large number of very small-scale producers and service units which tend to be family-owned, use simple and labour-intensive technology, and employ unpaid family workers or low-wage workers with low educational levels. The informal sector provides

Development Bank (1997: 9-10) pointed out that, despite their insufficient technical, marketing, financial and managerial capabilities, such very small-scale firms have a potential to serve some major development objectives: 1) poverty reduction; 2) employment generation; and 3) the empowerment of women.

For example, 64 percent of the Indonesian total employment in 1990 was in the informal sector (ADB 1997: 121-4). This may suggest that microenterprises provide employment opportunities to poor groups in the informal sector. A recent ILO report (1999) based on the Indonesian economic census of 1996 indicated the significant contribution to employment and income generation of microenterprises in the food processing, wood processing, textile and garment subsectors in the informal sector. On the basis of a survey conducted by the Philippines National Statistical Office and ILO in 1995, ADB (1997: 130) described that approximately 55 percent of informal sector households in Metro Manila relied on the activities of microenterprises run by the household head or other members of the household, while around 30 percent relied on wage employment. As an example of women's empowerment, ADB (1997: 118) mentioned the case of Bangladesh, where a much higher share of females (67 percent of all females in the rural non-farm sector employment) was employed in rural informal manufacturing than males (32 percent).

SMEs also play important roles in the formal sector. They can provide ancillary support to LEs through inter-firm transactions and realise potential benefits from the division of labour, which will be explained in the next section. In Japan in the 1960s, LEs started to purchase intermediate inputs on a substantial scale from supporting industries, most of which were small-medium producers (Hondai 1995: 82). For example, Matsushita, a large consumer electronics manufacturer in Japan, had by 1980

---

local markets with cheap and low quality goods or those which are not produced by the formal sector. For this argument on the informal/formal sector in the context of SMEs, see Van Diermen (1997: 15-20).

roughly 1,000 supplier firms (Hoong 1992: 20). Japanese LEs sourced a wide range of parts, components or processing services from SMEs that specialise in specific products and production processes.

Before the 1997-98 crisis in East Asia, the growing demand associated with rapid economic growth encouraged many local and international assembler firms in the region to contract out part of the production processes to supplier firms.[9] This circumstance provided LEs with an impetus to foster reliable small-medium producers as local supporting industries.

According to a JICA study (1995), the auto parts and components industry in Thailand emerged in the first half of the 1960s parallel to the development of the automobile assembly industry. The JICA study reported that the total number of companies in the automotive supporting industry was 395 in 1993, of which nearly two thirds were small-medium supplier firms with 200 or less employees. These SMEs developed through subcontracting business with assembler firms in the growing automobile market in Thailand.[10]

A directory issued by the Indonesian Automotive Parts and Components Industry Association (GIAMM) in 1997 listed 125 firms as member companies.[11] More than half of them were small-medium supplier firms with 299 or less workers. A JICA study (1997), which focused on Indonesian supporting industries, found that automobile assembler firms intended to nurture and develop these small-medium supplier firms in order to reduce production costs through the promotion of local production of parts and components. Although there were many problems that these SMEs had to overcome,

[9] This could possibly have been caused by a tendency of LEs to wish to benefit from advantages of vertically disintegrated production systems, which will be explained in detail in Section 2.3.
[10] As of 1993, more than 70 percent of automotive parts producers in Thailand were engaged in subcontracting business with automobile assembler firms. The JICA study (1995) found that these subcontractors in particular increased production and local content ratios during 1988-93.
[11] If second- and lower-tier subcontracting firms and non-OEM (original equipment manufacture) spare parts producers are added, the number of parts producers becomes much larger than the above figures in Indonesia. Chapter 5 presents further discussion on this issue.

the development of small-medium supporting industries contributed to the improvement of efficiency and competitiveness in the automobile sector (JICA 1995).[12]

Depending on the circumstances, there are several different roles that SMEs can play in economic development. As Chapter 4 will explain in detail, this study will seek to analyse the development of small- and medium-scale manufacturing enterprises in the last context mentioned above. It will focus on SMEs as supporting industries.

2.3 Theoretical Framework of Subcontracting for SME Development

This section explains the theoretical foundations of this study. It considers the fundamental reasons why subcontracting arrangements are under certain conditions suitable for developing economies as vertical production arrangements from among possible alternatives. Particular alternatives are spot market transactions, vertically integrated production arrangements and subcontracting transactions. All of these arrangements govern vertical relationships between large-scale assembler firms (or the assembling process) and small- and medium-scale supplier firms (or the parts/components producing process).

After examining the potential advantages from an inter-firm division of labour, this section discusses the nature, expected benefits and motivations of subcontracting transactions, the basic conditions necessary for the implementation of subcontracting practices, and several types of subcontracting linkages useful for the development of SMEs.

[12] Based on the responses from Japanese-affiliated assembler firms in Thailand and Indonesia, "insufficient quality and precision," "unstable delivery timing," and "lack of local supplier firms" are the main common problems with local procurement (Japan Overseas Enterprises Association 1994: 66).

2.3.1 Vertical Production Systems

Opportunities for the division of labour are closely related to the stage of industrialisation and economic development (Mead 1984: 1095; Stigler 1951). In an early stage of industrial development, the main production activities that involve the production of raw materials, their transformation into final products, and the selling of the output are often carried out within one firm. However, with the progress of economic development, each of these processes in the production system may evolve into separable activities, each of which tends to be separately dealt with by a number of independent specialised firms.

Stigler (1951: 188) stated that the division of labour is particularly encouraged by the size and growth of a market. If all production processes are undertaken within a single company in the growing market, the cost of coordination for a wider range of internal operations rises and some resources may be underutilised. The expansion of the market urges firms to specialise in individual business activities, such as the production of raw materials, the production of parts and components, and the assembling of products in order to increase productivity. The participation of supplier firms in the specialisation of production processes would improve production efficiency and achieve economies of scale, both for the individual firms involved and the economy as a whole, through a more economical use of resources. A precondition is that production processes are divisible. Spot-basis exchanges can reduce the price levels of input materials, if supplier firms operate in a competitive market environment.

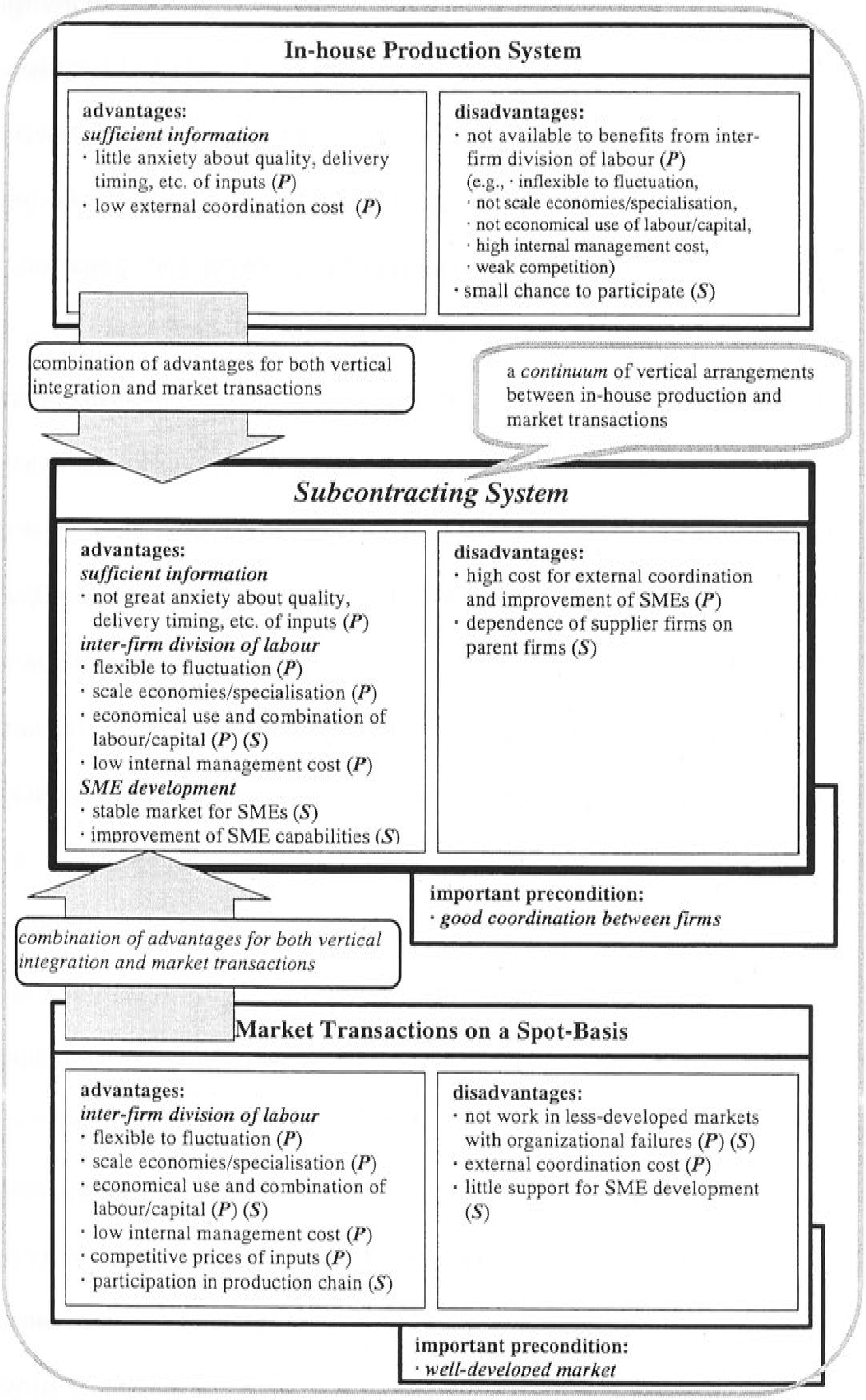
In an efficient market with low transaction costs and risks, spot-type transactions based on prices would be effective and sufficient to coordinate the market and promote the division of labour. In that situation, the inter-firm division of labour through simple one-off exchanges could improve the overall efficiency of production in the economy.

However, markets do not necessarily work efficiently and perfectly, particularly in less-developed economies (Hayami 1998: 5). Williamson (1975: 20-40) listed the following factors as organisational failures of markets: 1) uncertainty/complexity and bounded rationality; 2) small-numbers exchange relations and opportunism between participants; [13] and 3) information impactedness (information disparities between participants). In circumstances where contracts cannot completely cover uncertain and complex situations, spot markets do not economise production costs. In the case of current and future transactions between only a small number of players, spot markets amplify opportunistic behaviour among them. Information asymmetry increases the risk of market exchanges and the cost of transactions between the parties. Figure 2.1 summarises the advantages and disadvantages of pure market transactions on a spot-basis in comparison with in-house production and subcontracting. Key aspects of these vertical production systems will be discussed below.

In developing economies, there are usually significant uncertainties and risks in the market and the wider economy. There tend to be limited numbers of assembler firms and capable supplier firms. Hence, the market is not so competitive. Products and associated technologies are not highly standardised or well diffused, and information on the market appears incomplete and asymmetric between buyers and sellers. These conditions imply that markets in developing economies are not perfect and cannot sufficiently coordinate transactions between buyers and sellers.

[13] The behaviour called "opportunism" refers to a lack of fairness or truthfulness in transactions. Recurrent spot transactions across the market are particularly costly and risky when opportunism appears together with the small number of supplier firms (Williamson 1975: 9-10; 1985: 47-49, 64-67).

Figure 2.1 Advantages and Disadvantages of Vertical Production Systems



Note: (*P*) = advantages/disadvantages for parent firms, (*S*) = those for supplier firms.
Source: Prepared by author based on discussions in 2.3.1.

In fact, Lall (1980: 203) studied inter-firm linkages in India and noted that, in developing economies, there are very few markets that perform under perfect conditions in which technologies can be easily diffused, a large number of buyers and suppliers operate, no monopolistic or oligopolistic party exists, and future trends can be foreseen in a rational manner. Under such imperfect market conditions, it is difficult for assembler firms to purchase, through spot transactions, products and processing services that are satisfactory with respect to quality, quantity and delivery timing.

To overcome organisational failures of markets, there are basically two alternatives to spot market transactions. One is the vertical integration system, in which production processes from raw materials to intermediate inputs and assembling are vertically integrated and brought under the control of one management group. The other is the subcontracting system, where various activities in production processes are contracted out by a principal firm to supplier firms based on long-term contracts together with technical specifications. Costs associated with internally hierarchical transactions and subcontracting transactions are very different (Hayami 1998: 6).

Figure 2.1 shows that a vertically integrated production system can minimise transaction costs through the internalisation of spot-base exchanges in the open market (Coase 1937: 390-3). Imperfect or asymmetric information problems can be overcome by controlling almost all production processes within one organisation. In that case, parent firms do not have to supervise supplier firms in terms of quality, quantity, cost and delivery timing of input materials. On the other hand, labour and capital costs in this system are largely fixed for assembler firms because these firms need to have more employees, machinery and equipment, and other production facilities, relative to firms that concentrate on specific processes. Such a structure of production requires assembler firms to engage in not only advantageous but also disadvantageous production processes. This may lead to underutilisation of factor resources, employment of high-wage workers, an increase in internal management costs, and possibly inflexibility in times of drastic economic fluctuations (Coase 1937: 394-7). In-house production also takes away opportunities to reduce the prices of parts and components which may be obtained by making supplier firms compete.

Figure 2.1 also explains subcontracting, which is considered as a continuum of vertical governance arrangements between vertical integration at one extreme and spot-base market transactions at the other (Joskow 1985: 36). There is a possibility that subcontracting emerges and evolves, if two other alternatives, in-house production and one-off exchanges, are not economical or feasible. A subcontracting system may provide assembler firms with advantages for both vertical integration and market transactions, which include: 1) scale economies and concentration on specialised manufacturing activities; 2) reduced underutilisation of labour and capital resources; 3) exploitation of economies of small-scale production such as lower labour costs of the SME sector; 4) utilisation of specialised technologies and expertise owned by supplier firms; 5) reduction of the cost of monitoring own employees; and 6) flexible response to drastic economic changes (Coase 1937: 394-7; Hayami 1998: 6-7; Lall 1980: 205-7; Mead 1984: 1096-7; Watanabe 1971: 56-7).[14]

On the other hand, parent firms in a subcontracting system need to bear transaction costs associated with inter-firm relations. As described before, markets do not generally work well in developing economies, due to several reasons such as small numbers of assembler firms and competent supplier firms and significant uncertainties and risks. Parent firms are therefore required; 1) to find supplier firms with potential capabilities; 2) to establish and maintain close relationships with such supplier firms; 3)

[14] Lall (1980: 206) used the term, "economies of small-scale production," to express benefits to be provided by the SME sector which include the use of less capital-intensive and simpler technology, smaller overheads, more flexibility, etc. in addition to lower wages.

to enable supplier firms to meet requirements such as quality, cost (price) and delivery timing, by enhancing their capabilities through technical and other necessary support; and 4) to force supplier firms to fulfil contract terms without creating moral hazards (Coase 1937: 390-3; Hayami 1998: 7; Williamson 1985).

Whether subcontracting transactions will come into use will therefore depend on the balance between benefits and transaction costs associated with this vertical disintegration relative to two other alternatives, spot-type transactions and vertical integration, and the distribution of these benefits and transaction costs between parent firm and supplier firms (Hayami 1998: 7; McMillan 1990: 52). If one-off exchanges and vertical integration are not feasible or economical for parent firms, subcontracting arrangements that govern transactions with supplier firms can be expected to economise on transaction costs and serve as a practical production system (Coase 1937: 395; Joskow 1985: 23). When subcontracting is selected as a production system, it should be feasible and economical for supplier firms as well, compared to pure market transactions on a spot-basis.

2.3.2 Subcontracting for the Development of SMEs

With reference to the existing literature (e.g., Berry 1997: 7; Hondai 1995: 79; Lall 1980: 203; Tsutomu Nakamura 1983: 50; Nishiguchi 1994: 3; Odaka 1978; Watanabe 1971: 54), this study defines or understands subcontracting and other related terms in the following way:

(1) subcontracting is when a firm (the parent or principal firm) places an order with another firm (the supplier or subcontracting firm, or subcontractor) for parts and

components production, material processing services, or sub-assembling and assembling activities which will be incorporated into a product which the parent firm seeks to sell;

(2) the parent firms are often, but not always, large-scale enterprises, while many of the supplier firms are usually small-medium enterprises;

(3) subcontracting practice differs from the simple purchasing of ready-made parts and components in spot markets in that a written or oral agreement between the parent firm and the supplier firm stipulates the detailed technical specifications of the custom-tailored goods; and

(4) the parent firm and the supplier firm usually keep close business relationships and repeat transactions with each other in the longer term.

As indicated above, subcontracting systems can under certain conditions become effective in generating benefits for parent firms. Tsutomu Nakamura (1983: 52) argued that the subcontracting system as a quasi-vertical integration system or a continuum between vertical integration and spot-base market exchanges offers advantages embedded in both types of vertical production arrangements. Similar to the vertically integrated system, the subcontracting system can coordinate the parties engaging in different production processes through close relationships between principal and supplier firms. At the same time, similar to the one-off exchanges, the quasi-vertical integration system can respond in a flexible manner to changes in economic situations, generate economies of scale and achieve the economical combination of production factors.

Subcontracting arrangements are not only beneficial for large-scale parent firms but also for small- and medium-scale supplier firms, as shown in Figure 2.1.

Subcontracting relationships are generally associated with the mechanisms for the development of SMEs. As described in the previous section, the main constraints on SME development in developing economies are unfavourable access to markets, market information, raw materials, capital, modern technology, managerial skills, sufficient production facilities and so on. Under subcontracting systems, large-scale parent firms may enhance access to these kinds of resources which are not generally available to SME supplier firms to a sufficient degree.

Based on experiences in East Asian economies, several studies have indicated the potential benefits from subcontracting transactions for small and medium supplier firms (e.g., Otsuka 1998: 450; Supratikno 1998: 18; Watanabe 1971: 65; Yuwono, Supramono and Rietveld 1994: 358). One of the most important advantages is that large-scale principal firms, in general, guarantee to purchase parts and components produced by small-medium supplier firms over a long period.[15] In addition, parent firms can supply input materials to subcontracting SMEs. This provision of raw materials and intermediate inputs contributes to a saving in scarce working capital for SMEs. Moreover, large parent firms can provide small-medium supplier firms with technical assistance and second-hand equipment, which enable the latter to improve the quality, cost and delivery of products. For instance, Kojima and Okada (1997: 19) appraised the role of subcontracting networks in upgrading technological capabilities of Japanese casting SMEs. Kim and Nugent (1999: 125-37) illustrated that large-small linkages in Korea have functioned as important technological support mechanisms for SMEs.

---

[15] This continuing and long-term purchase of specific items allows supplier firms to promote specialisation in areas in which they are able to employ a technology (e.g., casting, forging and stamping) and are able to produce parts (e.g., crankshaft, fuel tank, leaf spring and disk brake) in the most advantageous way.

Hondai (1992: 176-8) summarised the benefits which SMEs can obtain from subcontracting transactions with large-scale parent firms as follows:

(1) the reduction of information and transaction costs through subcontracting ties, which includes easy and cheap acquisition from large-scale parent firms of new technologies, product designs, production processes, management methods, marketing and input materials;
(2) the reduction of risks and uncertainty and an increase in the expected rate of profit as a consequence of stable orders and better payment conditions; and
(3) the improvement of creditworthiness, for example, in the form of debt guarantees by parent firms.

In this way, the subcontracting system can potentially help SMEs in developing economies overcome impediments to growth and performance.

2.3.3 Types of Subcontracting Linkages in Developing Economies

With special reference to India, Lall (1980: 207) specified the following four groups of market imperfections and related problems as the main reasons for the establishment of various types of subcontracting relationships in developing economies:

(1) technical problems: markets in developing economies cannot by themselves provide potential supplier firms with a good environment for the development of technological competence to satisfy the demand for products with sufficient quality, quantity and cost required in modern industry;

(2) uncertainty about delivery: it is difficult for buyers to ensure the purchasing of parts and components at preferable timing in the markets in developing countries without any special institutional arrangements, because of supplier firms' opportunistic attitudes, uncertainty beyond the control of supplier firms, incomplete market information and insufficient numbers of competent supplier firms;

(3) coordination of future capacities: market forces in developing economies cannot necessarily coordinate investment capacities of parts supplier firms to be required by individual parent firms without the direct exchange of information on future plans; and

(4) sharing of revenues: due to the absence of competitive prices in the markets for parts and components in developing countries, other means are required to determine the price levels that result in a reasonable sharing of revenues for both large-scale parent firms and small-medium supplier firms.

After considering several factors including such organisational failures of markets, parent firms may decide to contract out the production and processing of parts and components to supplier firms through subcontracting arrangements. The following three types of subcontracting represent the main motivations of principal firms to implement transactions with supplier firms (e.g., Chew 1988: 37; Li 1992: 30; Nabi 1985: 14-5):

(1) specialised subcontracting: parent firms that do not have specific skills, technologies or facilities necessary for their operations can commission supplier firms that have such skills, technologies or facilities to deal with some parts of production processes in a supplementary way;

(2) economic subcontracting: in cases where in-house production is not economical, principal firms contract out some parts of production processes to supplier firms; and

(3) capacity subcontracting (cyclical subcontracting): parent firms can respond to changing demand in fluctuating markets, by utilising the production capacity of supplier firms.

Specialised subcontracting may allow assembler firms to utilise the particular skills that SMEs possess, ensure the purchasing of better parts and components in terms of quality, price and delivery time, and concentrate on assembling and other advantageous processes. However, under specialised subcontracting, small-medium supplier firms need to achieve certain levels of technological and other capabilities that satisfy the requirements of principal firms. Economic subcontracting may enable parent firms to reduce production costs through the utilisation of lower wages of SMEs, reduction in costs for monitoring their own employees, and the generation of scale economies through concentration on specific processes. When assembler firms are interested in capacity subcontracting, they expect SMEs to become shock absorbers that allow them to avoid underutilisation and/or capacity shortfalls at times of drastic changes in production volume.

These motivations encourage principal firms to have a wide range of vertical inter-firm linkages with small-medium supplier firms. Taking account of the above market imperfections and motivations, and based on his field survey in India, Lall (1980: 208-9) presented ten types of linkages generally observed in subcontracting:

(1) establishment-oriented linkages: encouraging the establishment of supplier firms capable of producing better and cheaper parts;
(2) location-oriented linkages: facilitating local and foreign supplier firms in setting up their production facilities close to principal firms;
(3) information-oriented linkages: providing supplier firms with information on production and investment planning for the short- to long-term period;
(4) technology-oriented linkages: assisting supplier firms in acquiring technology necessary for adequate quality of products;
(5) finance-oriented linkages: providing supplier firms with financial assistance for supplementing capital deficiencies in their operations;
(6) raw materials-oriented linkages: assisting supplier firms in overcoming uncertainties about the quality and availability of raw materials;
(7) management-oriented linkages: improving the managerial capability of supplier firms through training and other assistance;
(8) pricing-oriented linkages: establishing a procedure to achieve reasonable prices between parent and supplier firms;
(9) distribution-oriented linkages: adjusting the distribution of revenues and costs between parent and supplier firms by means other than prices such as sharing of inventory cost, product development cost, and replacement markets; and
(10) diversification-oriented linkages: encouraging supplier firms to diversify their markets at home or abroad.

Basically, most subcontracting relationships may facilitate the better functioning of inter-firm transactions under conditions in which markets are imperfect and vertical integration is not economical. However, as Lall (1980: 209) argued, not all types of subcontracting linkages in the previous explanation are, of course, necessarily beneficial to SMEs, LEs, or the economy as a whole. For example, unequal market power between buyers and sellers may be found in subcontracting ties.[16] Some subcontracting linkages may be the consequence of responses to misguided industrial policies in the public sector, whereas other linkages may reflect collusive anti-competitive behaviour in the business sector.[17] Lall, therefore, emphasised the need for detailed case studies to reveal the real impact of subcontracting linkages in different environments. The types of subcontracting ties usually vary with the social, cultural and economic systems in individual countries. In this sense, for instance, Japan's subcontracting models need to be carefully interpreted, with attention to not only advantages but also limitations, when seeking to draw lessons that may be relevant to other countries (Hill 1985: 247; Van Diermen 1997: 27; Watanabe 1974: 405).

2.3.4 Difficulties with and Conditions for Subcontracting Arrangements in Developing Economies

While there are potential benefits from subcontracting, it is not easy to arrange subcontracting business in such a way that all these benefits are captured. Referring to Baranson's study on the diesel manufacturing sector (1967: 68-9) as an example, Watanabe (1974: 414-5) listed the following four sets of inadequacies as problems in the development of subcontracting systems in India:

---

[16] In fact, during the 1950s and 1960s, subcontracting SMEs in Japan struggled with subordinate relationships with large-scale parent firms, which reflected the power imbalance between the former and the latter. This will be explained in Chapter 3.

[17] Chapter 4 will discuss misguided SME policies in Indonesia.

(1) insufficient technical and engineering experience required for the acquisition of modern technology and its adaptation to local conditions;
(2) insufficient workers' skills and discipline, such as the ability to read blueprints, set up tools and equipment, and operate machinery and equipment;
(3) insufficient industrial organisation, which impedes small-scale workshops from serving as ancillary industries for the modern large-scale industrial sector; and
(4) insufficient size of domestic markets and insufficient rates of economic growth.

Based on a series of interviews with selected local supplier firms in Malaysia, Li (1992: 33-36) identified the following common factors as the main obstacle to the establishment of functional inter-firm relations between LEs and SMEs:

(1) difficulties of SMEs in purchasing machinery and equipment that satisfy the requirements of LEs due to capital shortages as well as uncertainties and high risks;
(2) lack of entrepreneurship in supplier SMEs;
(3) red tape in the government sector (e.g., customs regulations and taxes);[18]
(4) shortages of skilled labour in the SME sector;
(5) lack of information on both potential principal firms and potential subcontracting SMEs;
(6) lack of incentives and encouragement for subcontracting businesses; and
(7) lack of technical support for the development of potential supplier SMEs.

[18] For example, in Malaysia around 1990, bureaucratic customs regulations often hampered the smooth transfer of input materials between Free Trade Zones (FTZs), where many LEs are located, and non-FTZs, where SMEs operate. This had an adverse effect on the development of subcontracting linkages. Also, the imposition of sales tax on the transactions of intermediate inputs tends to discourage the establishment of inter-firm linkages (Li 1992: 35).

Some studies investigated the basic conditions that are required to establish beneficial subcontracting linkages and make effective use of the above-mentioned potential advantages. Both Mead (1984: 1097-9) and Otsuka (1998: 449-51) suggested three major conditions for the founding of subcontracting systems. The first two conditions are the "technological divisibility" of production processes and "transportation costs" in moving subcontracting items from one stage to another. For technological reasons, production processes for some products (e.g., iron, steel and fertiliser) cannot be separated at all or without significant additional costs. Also, disintegration of production processes is costly or not feasible when the transfer of intermediate goods from supplier to buyer is not easy or economical, possibly because 1) two parties are located at a distance without good access to transport facilities to link the two locations or 2) intermediate products are heavy, bulky or fragile and, therefore, not transportable. In the case where these extra costs associated with technological separation and transportation are greater than potential benefits, subcontracting linkages are discouraged. On the other hand, if such additional costs are relatively smaller than expected benefits, the operation of subcontracting transactions is largely encouraged.

The third condition is "coordination between the participants and enforcement of contracts," which is crucial to carrying out subcontracting business. [19] For parent firms, coordination of separate producers and enforcement of contracts are necessary preconditions to ensure that supplier firms meet requirements regarding the quality, quantity and delivery timing of subcontracting items. Enforcement of fair transactions is also indispensable to supplier SMEs, because it can protect weak SMEs from unreasonably excessive requests by stronger LEs. In addition, the establishment of reasonable prices and payment conditions is an important coordination area for the

[19] In general, the old and complex legal systems that can often be observed in developing countries result in difficulties when it comes to enforcing contracts or penalising parties who do not comply with them (Mead 1984: 1099).

smooth operation of subcontracting practices (McMillan 1990: 52). Access to good communication infrastructure is an essential condition for the effective coordination of individual participants in subcontracting business. According to Mead (1984: 1098), if coordination and enforcement are difficult or costly, production is more likely to take place in a vertically integrated manner by parent firms through a hierarchical structure in which managers of the firms make the decisions. Also, SMEs may intend not to supply their products to large-scale principal firms through subcontracting transactions but sell their output on markets (e.g., spot-basis replacement parts market) through traders or in a direct way.

Accordingly, one of the key conditions that initiate and promote subcontracting business is some guarantee that the coordination and enforcement costs will not rise. In order to take full advantage of potential benefits from a vertically disintegrated production system, both LEs and SMEs have to reduce the coordination and enforcement costs for subcontracting through the establishment of relational contracts between them. [20]

2.4 Research Questions

With reference to the discussion above, this study assumes with care that the development of SMEs can be supported by the inter-firm division of labour through industrial subcontracting transactions. Based on this assumption, our study raises the following research questions in relation to SMEs and subcontracting linkages in Indonesia at present and Japan in the past.

[20] In addition to the private sector, the public sector can help reduce coordination and enforcement costs associated with subcontracting. For example, as Chapter 3 will elaborate, the Japanese government introduced various policies and laws to ensure fair and mutually beneficial subcontracting transactions between SMEs and LEs after World War II.

Question 1: *What is the essence of Japan's historical experience with SME development through subcontracting?*

How and why did subcontracting systems emerge and evolve in the Japanese economy? How and why did subcontracting linkages play an active role in the development of SMEs in Japan? This question is intended to examine Japan's historical experience with SME development through subcontracting to establish a point of reference and comparison for our study of SMEs and subcontracting in Indonesia.

Question 2: *Does the SME sector contribute to economic development in Indonesia?*

How has the Indonesian SME sector developed during the last few decades? Has the SME sector contributed to economic development in Indonesia and if so, how? How is its recent economic performance in terms of productivity, factor proportions, wages and so on? Are subcontracting relations between SMEs and LEs significant in the Indonesian manufacturing industry? Question 2 sketches a broad picture of the features of Indonesian manufacturing SMEs, particularly machinery SMEs, based on nation-wide data and information. Answers to this question can serve as a reference for a subsequent firm-level analysis.

Question 3: *What are external sources that support SME development in Indonesia?*

What kind of external support mechanisms have SMEs used to improve their capabilities? How effective have such external sources been for SMEs in developing their capabilities? Question 3 probes the external sources available to SMEs and examines how they work as support mechanisms for the development of SMEs in Indonesia, using data and information obtained from a firm-level survey. Our main interest is whether subcontracting relations with large-scale parent firms have supported Indonesian SMEs by supplementing their internal resources.

Question 4: *Can subcontracting improve productivity of SMEs in Indonesia?*

If SMEs consider subcontracting linkages with LEs as important support mechanisms, can subcontracting improve the production efficiency of SMEs in Indonesia? Specifically, does subcontracting cooperation with LEs have a positive impact on the productivity of SMEs? Question 4 will also be examined on the basis of micro-level evidence.

Question 5: *What are the mechanisms of subcontracting linkages in the Indonesian SME sector?*

Why do SMEs exploit subcontracting transactions with large-scale parent firms and how do SMEs initiate business relationships with LEs? What type of linkages with LEs do SMEs have through subcontracting business? What kind of costs and benefits have SMEs borne that are associated with and obtained from subcontracting transactions, and how significant are they? What are the conditions for larger gains from subcontracting ties? Question 5 is designed to investigate the mechanisms of subcontracting linkages that exist in Indonesia at present, on the basis of qualitative data obtained from a survey among SMEs.

Question 6: *What are the characteristics of subcontracting linkages with SMEs that Indonesian LEs have established?*

Why did large-scale assembler firms in Indonesia initiate subcontracting transactions with SMEs? What type of linkages have LEs established with SMEs through subcontracting? What kind of costs and benefits have LEs borne that are associated with and obtained from subcontracting transactions with SMEs, and how significant are they? To what extent do large-scale parent firms support their small-medium supplier firms? Question 6 will explore the detailed characteristics of subcontracting ties, from the perspective of LEs, on the basis of qualitative evidence from an interview survey.

Question 7: *Is Indonesia at present significantly different from Japan in the past?* What kind of similarities or dissimilarities exist between Indonesia at present and Japan in the past in terms of SME development, industrial subcontracting and related matters? Can subcontracting be beneficial to SME development in Indonesia, as in the case of Japan? Question 7 compares Indonesia at present as analysed in responses to Questions 2 to 6, with Japan in the past as discussed in the response to Question 1.

Chapter 3

SME Development and Subcontracting in the Japanese Manufacturing Industry: The Historical Experience

3.1 Introduction

Large-scale enterprises (LEs) and small- and medium-scale enterprises (SMEs) in the Japanese manufacturing industry developed concurrently in the process of industrialisation and economic growth from the 1930s (Hondai 1992). Ohkawa (1976: 149-66) ascribed the successful economic growth in Japan during the twentieth century (up to the 1960s) to SME development through close interactions between LEs in the modern sector and SMEs in the traditional sector. These patterns of industrialisation and industrial organisation in Japan in the past have been perceived as models for developing economies to follow. In such countries, including Indonesia, SMEs with traditional elements remain dominant, but require strengthening in order to absorb the growing workforce, or form the basis for further industrialisation (Hondai 1995: 67; Hondai and Murakami 1996: 35-6).

This chapter will look into the development of SMEs in Japan, and the evolution of vertical subcontracting ties which have linked SMEs that did not have sufficient internal resources with LEs that had technological, financial and other necessary resources. Despite the existence of some unique features in Japan, its past patterns of industrialisation and economic development have elements in common with developing economies in more recent years (Ohkawa and Kohama 1989). The purpose of this chapter is to review Japan's experience in order to: 1) establish basic ways to examine SMEs in Indonesia at present; and 2) provide material for a comparative analysis of Indonesian SMEs, at a subsequent stage in this study.

In context of the historical development of the Japanese economy and manufacturing industry, this chapter examines the growth of the SME sector and the evolution of subcontracting systems during the twentieth century. Specifically, it seeks to address the following questions: 1) how and why did subcontracting systems start and evolve in Japan's manufacturing industry?; and 2) how and why did subcontracting linkages contribute to the development of manufacturing SMEs in Japan? Answers to these questions will reveal the lessons that may be drawn from SME development through subcontracting in Japan for developing economies, particularly Indonesia.

Section 3.2 observes the emergence of subcontracting in the development of the Japanese economy and SMEs before World War II. Section 3.3 investigates the evolution of Japanese SMEs and subcontracting, with particular attention to the machinery industry, during the period of high economic growth after World War II. Section 3.4 examines how subcontracting linkages provided support mechanisms for SMEs, while Section 3.5 looks into the way in which subcontracting improved production efficiency of SMEs. Finally, Section 3.6 presents the essence of Japan's historical experience with SME development, which will be used as a point of reference for the analysis of SMEs and subcontracting in Indonesia in subsequent chapters.

3.2 SMEs and the Initiation of Subcontracting in Japan before World War II

Under the slogan *shokusan kogyo* (develop industry and promote enterprise), the Meiji government undertook a range of modernisation and industrialisation programs from the 1870s.[1] Table 3.1 shows that the primary and traditional sectors accounted for most employment during 1881-1935. However, due to private sector initiatives as well as these government efforts, the modern industrial sector significantly increased its share in employment from 1.8 percent in 1881-85 to nearly 12 percent in 1921-25. The rapid expansion of employment in the modern sector was observed particularly during World War I (1914-18). The war caused an overall shortage of goods in the world market and Japanese manufacturers took advantage of this opportunity to increase production for both exports and domestic demand (Yoshihara 1994: 10-1).

After both the recession in the early 1920s and the depression in 1930-31, Japan's manufacturing industry expanded rapidly. Output increased particularly in the machinery industry in the 1930s, due to a sharp increase in exports and the Japanese military expansion on the Asian mainland.[2] The economic boom from 1932 generated an environment in which large-scale manufacturers were not able to expand production fast enough to meet demand without contracting out work to supplier firms. In a

[1] The *shokusan kogyo* policies consisted of 1) the lending (or sale) of funds and equipment to private enterprises, 2) establishment (and later selling) of public sector factories, 3) promotion of a national banking system, and 4) building of infrastructure such as railroad and postal/telegraph networks (Takafusa Nakamura 1983: 59-60).

[2] From the early 1930s, demand for munitions and armaments grew. In the late 1930s, when military requirements increased rapidly, output in the machinery industry followed, expanding from 1.6 billion yen in 1936 to 4.3 billion yen in 1938 (Nishiguchi and Brookfield 1997: 90).

substantial sense, this was the beginning of subcontracting systems in Japan, which originated from the putting-out production systems that already existed.

Table 3.1 Growth of and Share in Employment in Japanese Primary, Modern and Traditional Industries, 1881-1935

	Growth of Employment over Previous Period (%)					*Share in Employment (%)*[1]				
	Total	*Primary*[2]	*Nonprimary*[3]			*Total*	*Primary*[2]	*Nonprimary*[3]		
		Total	*Modern Industry*	*Traditional Industry*	*Total*		*Total*	*Modern Industry*	*Traditional Industry*	*Total*
1881-1885	1.8	0.2			5.9	100	70.8	1.8 (6.2)	27.5 (93.8)	29.2 (100)
1886-1890	2.6	-0.2	15.3	8.8	9.2	100	68.9	2.1 (6.8)	29.1 (93.2)	31.1 (100)
1891-1895	3.4	-0.7	45.5	10.3	12.6	100	66.1	2.9 (8.6)	31.0 (91.4)	33.9 (100)
1896-1900	2.8	0.7	33.0	4.5	6.9	100	64.8	3.8 (10.8)	31.5 (89.2)	35.2 (100)
1901-1905	2.6	1.4	28.6	2.0	4.8	100	64.0	4.7 (13.1)	31.3 (86.9)	36.0 (100)
1906-1910	2.1	1.0	33.4	-0.2	4.2	100	63.3	6.1 (16.6)	30.6 (83.4)	36.7 (100)
1911-1915	2.6	-1.5	26.4	6.4	9.8	100	60.7	7.6 (19.3)	31.7 (80.7)	39.3 (100)
1916-1920	3.5	-9.1	44.4	18.0	23.1	100	53.3	10.6 (22.7)	36.1 (77.3)	46.7 (100)
1921-1925	3.4	-4.5	14.1	12.0	12.5	100	49.2	11.7 (23.0)	39.1 (77.0)	50.8 (100)
1926-1930	4.1	1.2	7.4	6.7	6.9	100	47.9	12.0 (23.0)	40.1 (77.0)	52.1 (100)
1931-1935	5.7	2.5	6.4	9.2	8.6	100	46.4	12.1 (22.6)	41.5 (77.4)	53.6 (100)

Notes: 1) Figures in parentheses indicate the shares in nonprimary sector employment.
2) Primary industry includes agriculture and forestry.
3) Nonprimary industry consists of modern and traditional industries. Modern industry employment includes the total number employed in factories with 5 or more employees in the areas of manufacturing, mining, education, civil service, private railroads and electricity, maritime, and municipal and village government.

Source: Nakamura, Takafusa (1983: 28).

3.2.1 Economic Development and SMEs in Japan before World War II

The process of Japan's economic development started in earnest around 1885 (Ohkawa and Kohama 1989: 24). Table 3.2 shows the composition of production, exports and imports by industry in Japan from that year. Before World War II, Japan tended to import textile materials (e.g., cotton yarn and wool), process them and export semi-finished or finished textile products. In this period, textile items (including both industrial and primary products) accounted for roughly 25 to 40 percent of total imports and manufacturing production and around 45 to 65 percent of total exports. A variety of manufactured products such as buttons, camphor, lacquer ware, matches, straw plaits and toys made up the rest of production and exports. In broad terms, the earnings from exports of these textile and sundry goods financed the imports of chemical, metal and machinery products, many of which were not produced domestically due to the lack of modern industrial capacity. Thus, before World War II, Japan tended to produce and export traditional or simple manufactured products, while it imported other industrial products and various primary products used as inputs.[3]

What roles did manufacturing SMEs play in this structure of industry and trade? Table 3.3 presents the share of SMEs in the Japanese manufacturing industry. In 1909, when Japan's first manufacturing census was published, SMEs with 5-99 workers accounted for 97 percent of factories and 58 percent of manufacturing employment. In the machinery sector, SMEs occupied around 96 percent and 43 percent of factories and

[3] The gradual development of heavy and chemical industry since World War I and the yen depreciation due to Japan's abandonment of the gold standard in 1931 increased exports of Japanese chemical, metal and machinery products in the 1930s. In this decade, fertiliser, steel plate, insulated wire, simple textile machinery and parts, and simple electrical machinery and parts were typical export items produced in the heavy and chemical industry. However, before World War II, the share of these products in production and exports was smaller than that of traditional products (Tominaga 1999: 31-8).

employment, respectively. These proportions fluctuated, but remained broadly constant until World War II.

Table 3.2 Share of Product Goods in Production, Exports and Imports in Japan, 1882-1980 (Annual Averages)

	Industrial Products (%)				Primary Products (%)		
	Textiles	Chemicals, Metals and Machinery	Other Industrial Products	Industrial Products (total)	Textile Materials [1]	Fuels and Metal Materials [2]	Primary Products (total)
Value of Production in the Manufacturing Industry							
1882 - 1891	33.1	18.8	48.1	100.0			
1902 - 1911	32.6	20.9	46.5	100.0			
1917 - 1926	36.5	29.1	34.4	100.0			
1930 - 1939	26.3	46.2	27.5	100.0			
1956 - 1960	13.0	58.1	28.9	100.0			
1966 - 1970	8.2	63.4	28.4	100.0			
1976 - 1980	5.9	65.3	7.5	100.0			
Exports							
1882 - 1891	8.8	7.2	9.1	25.1	36.8	5.1	74.9
1902 - 1911	27.7	12.6	14.5	54.8	26.2	4.9	45.2
1917 - 1926	35.2	14.3	14.0	63.5	28.4	0.8	36.5
1930 - 1939	35.0	26.5	18.6	80.1	13.1	0.0	19.9
1956 - 1960	32.0	45.1	18.4	95.5	-	-	4.5
1966 - 1970	13.7	71.2	13.4	98.3	-	-	1.7
1976 - 1980	4.7	87.1	4.5	99.1	-	-	0.9
Imports							
1882 - 1891	37.3	26.6	17.4	81.3	5.8	6.4	18.7
1902 - 1911	9.4	32.3	12.1	53.8	25.9	4.1	46.2
1917 - 1926	5.0	30.8	9.9	45.7	29.5	3.7	54.3
1930 - 1939	2.5	29.7	9.8	42.0	25.1	10.0	58.0
1956 - 1960	0.5	19.7	3.1	23.3	19.3	29.5	76.7
1966 - 1970	1.2	23.3	5.8	30.3	6.9	34.0	69.7
1976 - 1980	2.9	16.2	1.6	25.0	2.3	51.1	75.0

Notes: 1) Textile materials for exports are raw silk.
2) Fuels and metal materials for exports are copper.
Sources: Calculated from Yamazawa and Yamamoto (1979: 5-6, 15) and Yamazawa (1984: 240-5).

Table 3.3 Share of SMEs in the Japanese Manufacturing Industry, 1909-1980

	Number of Establishments				*Number of Employees*				*Gross Output* [1]			
	SMEs (I) [2]			*SMEs (II)* [2][3]	*SMEs (I)* [2]			*SMEs (II)* [2][3]	*SMEs (I)* [2]			*SMEs (II)* [2][3]
	4-29	*30-99*	*4-99*	*4-299*	*4-29*	*30-99*	*4-99*	*4-299*	*4-29*	*30-99*	*4-99*	*4-299*
Manufacturing												
1909	86.0	10.8	96.7	-	36.0	21.9	58.0	-	-	-	-	-
1920	83.1	12.4	95.4	-	27.0	19.2	46.2	-	-	-	-	-
1930	85.2	10.6	95.8	-	28.7	19.9	48.6	-	22.4	19.9	42.3	-
1937	86.2	10.1	96.4	-	27.3	17.8	45.1	-	17.5	15.8	33.3	-
1954	86.4	10.5	96.9	99.1	35.4	19.8	55.2	69.3	20.2	17.1	37.4	54.7
1960	81.6	14.1	95.6	98.8	29.1	22.0	51.1	67.3	14.7	16.4	31.1	47.9
1970	85.6	10.5	96.1	98.9	29.6	19.7	49.3	66.0	15.6	15.7	31.3	48.4
1980	87.4	9.3	96.7	99.2	35.0	20.3	55.3	71.8	17.5	16.3	33.8	51.4
Machinery only												
1909	86.2	10.0	96.2	-	26.5	16.3	42.8	-	-	-	-	-
1920	82.3	12.2	94.5	-	15.0	11.6	26.6	-	-	-	-	-
1930	87.4	9.0	96.4	-	24.1	15.1	39.2	-	14.3	14.3	28.6	-
1937	83.6	12.0	95.5	-	19.0	14.6	33.6	-	13.3	13.6	27.0	-
1954	79.2	15.1	94.3	98.2	22.0	18.4	40.4	55.7	11.6	14.1	25.7	41.4
1960	71.1	20.8	91.8	97.6	16.3	19.2	35.6	52.4	7.1	11.7	18.8	31.9
1970	78.0	14.8	92.8	97.7	16.6	16.1	32.7	48.8	8.3	10.7	19.1	31.8
1980	81.8	12.4	94.2	98.2	21.2	16.7	37.9	54.5	9.6	10.7	20.3	33.9

Notes: 1) The data of output before World War II (no data in 1909 and 1920) represent value of gross output, while those after World War II indicate value of shipments.
2) Firm size here is in terms of the number of employees. The data before World War II cover factories with five (not four) or more workers.
3) Before World War II, the data for establishments with 100-299 workers are not separately classified. Therefore, the share of factories with 299 or less workers cannot be calculated in that period.

Sources: Before World War II, calculated from MITI (1961: 180-1, 658-9). After World War II, calculated from MITI, *Kogyo Tokei Hyo* (Census of Manufactures).

Up to World War I (1914-18), the average level of personal consumption in Japan did not increase significantly and Japanese producers were internationally competitive only in cheap but low-quality consumer goods. As a consequence, SMEs largely engaged in production of traditional goods (e.g., raw silk, fabrics, lacquer ware, bamboo products, pottery), most of which simply required handicraft operations suitable for home industry or small producers. However, some SMEs attempted to modify traditional production techniques and manufacture new types of products in competition with large-scale manufacturers equipped with imported machinery. Takeuchi (1991: 166) discussed examples such as small-scale brush producers who devised simple wood-framed machines for planting bristles, as alternatives to imported metal-framed ones, and small-scale shell-button producers who developed hand- or foot-driven drilling and grinding machines, as alternatives to Western power-driven ones. In the same period, SMEs that produced simple machines and parts and were engaged in repair work were operating in the machinery industry. These SMEs supplied their products to other SMEs that did not require high quality. They were not able to produce parts and components for large-scale machinery manufacturers in the modern sector, because of the inferior quality of their products (Whittaker 1997: 20-1).

World War I created an opportunity to expand Japanese manufacturing production for both exports and domestic demand. Japan's industrial GDP (including manufacturing and mining) grew by 8.3 percent annually during 1914-19 (Ohkawa, Takamatsu and Yamamoto 1974: 227). In response to this boom, the number of SMEs with 5 to 99 workers increased remarkably by nearly 40 percent from 30,000 in 1914 to 42,000 in 1919 (MITI 1961: 180-1). In addition, the share of SMEs that utilised electric power increased during the war. While the use of electric power was largely limited to firms with 30 or more employees before the war, it was available to roughly 60 percent of SMEs with 5 to 29 workers in 1920 (Komiyama 1941: 12-5). The rapid expansion of electricity production and distribution helped SMEs increase production capacity and improve their technological capabilities.

Throughout most of the 1920s and during 1930-31, Japan experienced an economic recession. Under these conditions, SMEs had to restrict themselves to the market for low-end goods and services, because of the poor quality of their products, insufficient power capacity and their use of primitive machinery (Whittaker 1997: 22-3). During these years, the majority of SMEs in the urban areas were still characterised by their short-term relationships with customers, irregular job orders and high worker turnover. Komiyama (1941: 98-101) and Tasugi (1941: 242-3) referred to these firms as *fudoteki* (floating or unstable) SMEs.

After the 1930-31 recession, the machinery industry grew significantly, due to substantial increases in export and military demand in the rest of the 1930s. In fact, value of production in the machinery sector in constant prices increased by nearly 18 percent per annum in the first half of the 1930s (Shinohara 1972: 146-7). The share of heavy and chemical industry (including chemical, metal and machinery sectors) in manufacturing output and employment surpassed that of the textile industry in 1935 and 1937, respectively (MITI 1961: Table 2.2). In this period of high economic growth, subcontracting production systems became important in the Japanese machinery industry.

3.2.2 Putting-out Systems as a Prototype of Subcontracting Systems

Until around 1930, a typical business form in Japan was the *tonya* (putting-out) system, particularly in light industries such as textile and sundry goods production. In terms of marketing and production operations, the small business sector was organised and controlled by traders or wholesalers through a putting-out system.

Komiyama (1941: 6-11, 26-31) distinguished between the old and new putting-out systems. Under the old putting-out system, traders and wholesalers with no production activities provided necessary equipment and input materials to farms and households that produced manufactured goods and commissioned them to produce simple processed products. Until around 1910, this old putting-out system was often observed in 1) silk reeling and weaving in rural areas, 2) the production of imitation flowers, matches and toys in urban slums, and 3) craftsman-type industries such as lacquer ware and porcelain-making (Komiyama 1941: 8-9). Farm and cottage industry sectors simply engaged in the production required by traders and wholesalers and earned incomes that were not much higher than workers' salaries.

During the 1910s, associated with the progress of industrialisation in Japan, the old putting-out household industry system shifted to the new putting-out factory system. Wholesale merchants still did not handle substantial production activities and controlled small-medium producers through the provision of input materials, market outlets and financial support. However, suppliers were no longer cottage industries but producers who often operated their own factories with paid workers and power-driven machinery and equipment.[4]

Fujita (1954: 133-7, 1965: 92-100) found that traders and wholesalers placed orders with cottage industries in Aichi prefecture for cotton fabrics up to the late Meiji era (around 1910) and that they started to organise small factories in addition to cottage industries after around 1910. This was in response to the expansion of markets and the increase in small factories that used electrically operated looms. Toyozaki (1949: 58-60) observed that, in some cases, small-scale metalworking and machinery factories

[4] During the 1910s, many SMEs employed power-driven machinery and equipment, but their power sources were different. Oil engines and steam engines were still widely used and the use of electricity started to increase (Yui 1994: 220-4).

were involved in putting-out systems controlled by wholesale merchants in the late 1910s.

As Tsutomu Nakamura (1983: 15) stated, putting-out systems linked agents and wholesalers with small-scale producers and allowed the agents and wholesalers to manage the processes of production. These systems could promote inter-firm division of labour and extend assistance to SMEs with limited internal resources in providing input materials, market outlets and financial support. However, traders and wholesale merchants did not have a profound interest in and sufficient knowledge of product quality and productivity, because they were not manufacturers. Therefore, traders and wholesalers were not able to substantially improve the technological capabilities of small-medium producers under the putting-out production systems.

3.2.3 Emergence of Subcontracting Systems in the 1930s

For around a decade until 1931, Japan faced a series of economic difficulties such as the post-war panic of 1920, the Great Kanto Earthquake of 1923, the Financial Panic of 1927, and the downturn of 1930 and 1931 due to the international Great Depression. However, the Japanese economy quickly recovered in the early 1930s, and thereafter experienced a period of high growth associated with the expansion of heavy industry under the quasi-wartime and wartime conditions before and during World War II.

This economic growth and development of heavy industry in the 1930s were a consequence of the reflation policy adopted by the government (Nishikawa 1996: 268-9). In the early 1930s, the gradual militarisation of the economy following the occupation of Manchuria in 1931 expanded domestic demand for products of the machinery industry. In addition, as Tominaga (1999: 3-9) emphasised, the yen depreciation due to Japan's abandonment of the gold standard at the end of 1931 resulted in a substantial growth of exports during the rest of the 1930s. The export boom induced significant increases in plant and equipment investment and private consumption, which contributed to the high economic growth in the 1930s.

The economic expansion of the 1930s provided a rapidly growing market to large-scale machinery manufacturers. Such a sharp increase in demand exceeded the existing production capacity of large-scale firms. To cope with the shortage of their output capacity, the large modern production sector could either expand their production facilities through investment or take advantage of the production capacity of SMEs through subcontracting (Tasugi 1941: 190-1). Before 1930, LEs used to produce a wide range of parts and other input materials in their own factories. There were few SMEs capable of supplying reliable parts.[5] In the 1930s, however, large enterprises in the machinery sector started to contract out to small supplier firms rather than expand their own production facilities. This reflected the following economic conditions at that time (Hondai 1995: 81; Mishina 1962: 86; Nishiguchi and Brookfield 1997: 90; Tasugi 1941:190-2, 283-6): 1) relatively expensive capital; 2) the surging export and military demand in an unpredictable and quickly changing world economy; 3) the availability of cheap labour in SMEs; and 4) the development of infrastructure and technology.

These economic conditions stimulated LEs in the machinery industry to contract out the production or processing of simple parts to SMEs. Hondai (1992: 27-34) found that the horsepower-labour ratio of the machinery industry declined between 1931-40

[5] Despite its preference for outsourcing from domestic firms, Toyota, which started the production of vehicles in the early 1930s and was officially established as an automobile manufacturer in 1937, had to depend entirely on in-house production and imported inputs at the initial stage of operation, because it could not find domestic supplier firms capable of producing reliable parts and components (Komiyama 1941: 41-2; Odaka 1981: 182-3). In fact, to ensure sufficient levels of metal materials, Toyota established the Toyota Steel Company (presently Aichi Steel), an affiliated company, in 1940.

during the growth of the economy.[6] After considering other possible factors, he concluded that this decline in the horsepower-labour ratio of the machinery industry resulted from the spread of subcontracting transactions between LEs and SMEs in the 1930s and that subcontracting substituted for capital, which was generally scarcer than labour in this period.

The ups and downs of the economy in the 1910s and 1920s dissuaded LEs from expanding their own production capacity in the 1930s. In the 1920s, they had experienced difficulties in adjusting their overcapacity caused by investment in plants and machinery during World War I (Tasugi 1941: 190). This experience made LEs more cautious about expanding their production capacity in the 1930s and more inclined to embrace subcontracting.

Table 3.4 Differences in Wages in the Japanese Manufacturing Industry by Firm Size, 1909-1980

Firm Size [1]	*1909*	*1914*	*1932/33*	*1950*	*1955*	*1960*	*1965*	*1970*	*1980*
1 - 9	82.3	78.5	51.8	33.9	35.5	37.4	35.0	38.2	37.5
10 - 19	87.6	83.1	65.3	46.0	43.3	47.2	60.9	63.5	58.1
20 - 99	96.5	91.9	82.9	59.7	52.2	57.2	69.8	70.0	63.1
100 - 299	-	-	-	75.8	67.4	68.2	78.0	76.9	75.2
1 - 299	-	-	-	54.0	51.0	55.7	62.3	62.9	58.1
300 -	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: 1) Firm size is based on the number of employees. Before World War II, the size category of 1-9 workers is 5-9 workers, that of 20-99 is 50-99, and that of 300 or more is 100 or more. Therefore, the data in that period do not exactly correspond to those after World War II.

Sources: Before World War II, Odaka (1984: 41) and Yasuba (1976: 258). After World War II, MITI, *Kogyo Tokei Hyo* (Census of Manufactures).

[6] Since other data representing capital stock were not available before World War II, Hondai used the horsepower-labour ratio, instead of the capital-labour ratio.

Table 3.4 indicates that differences in wage levels between small and large manufacturing firms in 1932/33 were higher than in 1909 and 1914. This may also explain why LEs in the 1930s were willing to contract out some processes to SMEs that used cheap labour, with the aim of reducing production costs.

Nishiguchi and Brookfield (1997: 90) pointed out that the development of national transportation and communication systems made it easier for SMEs to market their output. Standardised manufacturing processes and mass production systems enabled SMEs to participate in subcontracting business such as simple machining and drilling jobs. The increased use of electrically operated machinery and equipment supported by the improvement in access to electrical power integrated SMEs into production processes of LEs.

Table 3.5 shows the results of a survey on subcontracting transactions in the machinery industry in 1934.[7] Out of 734 valid responses, 571 firms or 78 percent of the total respondents had subcontracting linkages with 8,401 supplier SMEs. The cost of contracting out work to supplier firms accounted for 13 percent of the total output value.

What were the main features of the subcontracting system during the 1930s? Subcontracting was characterised as a subordinate business relationship. Large manufacturers forced small producers to supply cheap products through subcontracting transactions, by controlling the latter in terms of the supply of raw materials, the marketing of products and financing (Fujita 1954: 141-3).

---

[7] This survey, *Kikai-kigu Kogyo Shitauke Gaichu Jyokyo Shirabe* (Survey of Subcontracting in the Machinery Industry) (1936) conducted by the Japanese Ministry of Commerce and Industry dealt with machinery manufacturers with 30 or more workers in Tokyo, Kanagawa, Aichi, Osaka, Hyogo, Hiroshima and Fukuoka (Fujita 1954: 144-5; Komiyama 1941: 44-7; Tasugi 1941: 193-4).

Table 3.5 Subcontracting in the Japanese Machinery Industry in 1934

Firm Size (Number of Workers)	*Number of Sample Firms* [1)]	*Value of Production* (million yen)	*Contract-out Amount* (million yen)	*Contract-out Ratio* [2)] (%)	*Number of Supplier Firms* [3)]
- 29					4,263 (50.7)
30 - 49	179	22.8	6.3	27.6	945 (11.2)
50 - 99	167	40.3	8.9	22.1	666 (7.9)
100 - 199	110	65.1	13.7	21.0	336 (4.0)
200 - 499	60	132.3	13.9	10.5	307 (3.7)
500 - 999	24	76.9	12.1	15.7	101 (1.2)
1000 -	31	323.9	29.3	9.0	147 (1.7)
unknown					1,636 (19.5)
Total	571	661.3	84.2	12.7	8,401 (100.0)

Notes: 1) This survey covered seven prefectures (Tokyo, Kanagawa, Aichi, Osaka, Hyogo, Hiroshima and Fukuoka). According to *Kojyo Tokei Hyo* in 1934 (Census of Factories), there were 1,209 machinery factories with 30 or more workers in these prefectures. Out of 734 valid responses, 571 factories contracted out their parts and components to supplier firms.

2) contract-out ratio = (contract-out amount)/(production value) × 100

3) This represents the number of supplier firms that were used by 571 parent firms. The figures in parenthesis indicate the share of subcontractors by size. Nearly 20 percent or 1,636 of supplier firms were not classified in terms of firm size, because parent firms did not have sufficient information.

Sources: Fujita (1954: 144), Komiyama (1941: 45) and Tasugi (1941: 197, 199), all of which referred to the data from Ministry of Commerce and Industry (1936), *Kikai-kigu Gaichu Jyokyo Shirabe* (Survey of Subcontracting in the Machinery Industry).

Based on another survey of 335 sample firms in Tokyo in 1936, Komiyama (1941: 61-74) identified characteristics of the subcontracting linkages small-medium machinery producers had with large parent firms. His main findings were:

(1) smaller SMEs tended to deal only with the processing of parts, while larger SMEs tended to engage in producing parts;
(2) input materials were supplied to almost 40 percent of SMEs with 10 or less workers;
(3) financial support including investment capital and working capital was provided to around 10 to 20 percent of SMEs with 30 or less workers;
(4) only 10 to 20 percent of SMEs were exclusively attached to specific parent firms and most of them received financial support from parent firms;
(5) around 70 to 80 percent of SMEs had plural parent firms to avoid the fluctuation of sales; and
(6) almost 10 percent of SMEs with around 30 workers had two to three supplier SMEs.

Komiyama's observations indicated that parent firms tended to contract out simple processing work to smaller SMEs, and that support mechanisms for improving the capabilities of SMEs were not established well in subcontracting relationships between large parent firms and small supplier firms in the 1930s.

There were, however, some parent firms that fostered supplier firms. Komiyama (1941: 108-11) and Tasugi (1941: 247-54) elaborated the example of Okuma, a pioneer machine tools manufacturer in Japan, which intended to contract out several processes to SMEs for the purpose of enhancing the efficiency of its production structure. The machine tools company found that the number of competent SMEs was limited in the early 1930s and concluded that it was necessary to foster small-medium supplier firms in order to incorporate them into its production processes. Okuma perceived subcontracting with SMEs as beneficial and believed that SMEs could improve technological and other capabilities, if necessary assistance was provided. It promoted the development of SMEs through 1) an increase in the number of supplier firms exclusive to Okuma (almost 30 exclusive firms, out of 60 supplier firms), 2) provision of technical assistance including training and expert dispatch, 3) instructions for supplier firms to replace inadequate machinery and equipment, together with financial support for the purchase of new machinery and equipment, 4) supply of input materials and lending of tools, 5) advice on establishing wages of workers, 6) transfer of Okuma's workers to supplier firms, and 7) promotion of subcontractors to specialise in the use of specific technologies.

A different type of subcontracting arrangements beneficial to SMEs emerged due to the expansion of military demand. For the purpose of relieving the SME sector from the consequences of the recession in the late 1920s and early 1930s, the Kochi prefectural government requested the Kure Navy arsenal in Hiroshima to contract out metalworking and machinery work to local small-medium producers (Komiyama 1941: 111-4; Tasugi 1941: 289-300). Although the Kure Navy arsenal had concerns about quality, prices and delivery timing, it responded to the request and placed an order with local SMEs through the Kochi prefectural government and the local industrial association for simple metal products. Since the products of SMEs in Kochi were acceptable in quality and delivery time, other Navy and Army arsenals also started to contract out simple parts to local SMEs in several other prefectures in order to meet the expansion of military demand, utilise labour surplus in rural areas, and enhance weak SMEs in local areas.

Through such special subcontracting arrangements, Navy and Army arsenals, prefectural governments, local industrial associations, and the Ministry of Commerce and Industry provided SMEs in provincial towns with the following assistance: 1) dispatch of technical experts from Navy and Army arsenals; 2) loan of disused equipment and machinery owned by Navy and Army arsenals; 3) technical instruction by technical experts from prefectural governments; 4) national and local subsidies for improvement of production facilities; and 5) technical assistance including materials and products testing by prefectural laboratories (Tasugi 1941: 281-2). These special subcontracting arrangements encouraged SMEs located outside metropolitan areas to produce better products, because all organisations (i.e. Navy and Army arsenals, prefectural governments, local industrial associations and the Ministry of Commerce and Industry) responsible for this scheme paid attention to: 1) effective use of prefectural governments and industrial associations as intermediaries; 2) complete division of labour and distribution of orders to adequate firms among participant SMEs in each provincial town; and 3) transfer of knowledge on quality (Morris-Suzuki 1994: 134-5; Odaka 1981: 183-4).

In the 1930s, large-scale machinery manufacturers started to incorporate SMEs as supplier firms into their production processes. However, since the number of competent SMEs was limited, large parent firms became aware of product quality, production technologies and productivity of SMEs and the need to assist SMEs in becoming capable subcontractors. This is the reason why LEs in the machinery industry began to provide SMEs with various forms of support, including technical assistance, from the early 1930s onwards. Support mechanisms for SME development were associated with subcontracting linkages between SMEs and LEs.[8]

As armament production expanded and Japan became increasingly deeper involved in warfare on the Asian mainland and in the Pacific during the late 1930s and the early 1940s, the government strengthened economic controls, which constrained the

[8] Large-scale machinery manufacturers under subcontracting systems started to extend technical assistance to SMEs. This was different from the past, because in the putting-out system, traders and wholesalers did not provide SMEs with technical support.

business activities of the private sector. Economic controls on industry compelled smaller and weaker SMEs to exit and instructed the remaining SMEs to become subcontractors exclusive to specific large-scale machinery firms, particularly those producing for military usage. The number of SMEs that could continue operations decreased, as government controls and material shortages were getting tight toward the final stage of the Pacific war. These restrictions imposed on LEs and SMEs may not have been efficient, but established a model in which LEs and SMEs worked closely together in vertical production systems.

Before the war, the expansion of demand under the conditions of capital shortages, unstable market situations, wage gaps between LEs and SMEs, and the development of infrastructure and technology encouraged LEs to initiate and develop subcontracting business with SMEs. LEs started to provide several forms of support to SMEs that could not satisfy their needs. Large-scale parent firms considered that benefits from subcontracting with SMEs were more than the costs associated with technical and other support to SMEs. The prewar subcontracting experiences established the foundations for the development of the subcontracting system after World War II.

3.3 SME Development through Subcontracting in Japan after World War II

Japan's real GDP per capita in 1946 was less than 55 percent of the prewar peak level in 1934-36, while the manufacturing index in 1946 fell to almost one fifth of its peak level in 1944 (Kuroda 1993: 21). However, Japan recovered from this setback during the next 10 years. When the postwar recovery was finished, Japan continued a period of extremely high economic growth up to the early 1970s.

After World War II, a series of economic reforms was implemented such as abolition of military organisations, execution of land reforms, dissolution of Japan's industrial conglomerates (*zaibatsu*) and promotion of labour unions. These changes provided favourable conditions for increases in individual incomes. In addition to these internal conditions, better external economic circumstances in the 1950s and 1960s generated an economic boom, during which increases in both domestic demand and exports led to the expansion of machinery production.

The machinery industry developed as a leading sector in Japan's manufacturing industry after World War II. This section analyses the development of SMEs and the formation and structure of subcontracting systems during the postwar era of high economic growth. It focuses on the machinery industry.

3.3.1 High Economic Growth and SMEs in the Postwar Japan

Before World War II, as described above, Japan imported products of mainly heavy and chemical industries for which domestic production was insufficient, in exchange for exports of mainly textile products. After World War II, as indicated in Table 3.2, the structure of industry and trade in Japan changed significantly. Japan started to export industrial products, in particular high-quality chemical, metal and machinery products, which were manufactured by using imported primary materials.

Table 3.6 presents a concise overview of the growth and composition of manufacturing production in Japan between 1950 and 1980. Prior to the 1973 oil crisis, the Japanese manufacturing industry as a whole recorded high rates of growth of production of 18 percent and 14 percent per year, respectively, during 1950-60 and 1960-70. The production of both transportation equipment and electrical machinery in the machinery industry grew by more than 20 percent per annum during 1950-70, which was faster than other manufacturing sectors. In particular, the production of passenger cars increased by 46 percent annually during 1950-70.

Table 3.6 Growth and Share of Production in the Japanese Manufacturing Industry, 1950-1980

Subsectors	*Annual Average Growth of Production (%)* [1]					*Share of Production in Manufacturing (%)* [2]		
	1950-60	*1960-70*	*1970-80*	*1950-70*	*1950-80*	*1950*	*1970*	*1980*
Food	11.7	8.5	2.3	10.1	7.4	13.4	10.4	10.5
Textiles and Apparel	14.3	8.2	0.3	11.2	7.5	23.2	7.7	5.2
Lumber and Wood	7.2	4.9	-1.6	6.1	3.5	3.9	3.2	2.5
Chemicals	16.9	14.5	5.1	15.7	12.0	12.9	8.0	8.4
Iron and Steel	15.5	15.5	2.9	15.5	11.1	13.0	9.5	8.3
Machinery	26.7	18.2	6.6	22.3	16.9	13.9	32.3	31.8
General Machinery	20.9	16.9	4.2	18.9	13.7	4.8	9.9	8.2
Metalworking Machinery	34.8	12.3	-3.5	23.1	13.5	0.2	1.6	1.1
Sewing Machinery	18.7	3.2	-4.7	10.7	5.3	0.3	0.2	0.2
Electrical Machinery	32.1	19.6	8.8	25.7	19.8	3.1	10.6	10.4
Transport Equipment	26.8	19.0	5.9	22.8	16.9	5.2	10.5	11.6
Vehicles[3]	59.1	34.4	8.3	46.2	32.3	1.6	7.9	9.9
Bicycles	12.3	3.2	4.6	7.7	6.6	0.8	0.1	0.2
Precision Machinery	25.2	14.0	13.0	19.5	17.3	0.8	1.3	1.6
Manufacturing	18.1	13.8	4.2	15.9	11.9	100	100	100

Notes: 1) Calculated from indices of manufacturing production (base year = 1985).
2) Calculated from total value of shipments.
3) Average growth rates are calculated from the data on passenger cars, while production composition is based on those including all types of vehicles and motorcycles.

Sources: Calculated from MITI (1992: 94-7, 169, 171) and MITI, *Kogyo Tokei Hyo* (Census of Manufactures).

The share of the textile and apparel industry, the largest sector in the prewar period, decreased sharply in total manufacturing production from 23 percent in 1950 to 5 percent in 1980. In contrast, the production share of the machinery sector increased significantly from 14 percent in 1950 to 32 percent in 1980, reflecting its high growth during the period.

Table 3.3 revealed that SMEs occupied a significant share in the manufacturing industry after World War II. In the entire manufacturing industry, SMEs with 299 or less workers accounted for 99 percent of establishments, two thirds of employees and half the value of output from the mid-1950s to the 1970s. In the machinery sector, SMEs also had a considerable share in firm number, employment and production during 1954-80. Since 1909, the year of the first manufacturing census, the size distribution of LEs and SMEs in the Japanese manufacturing industry basically remained unchanged until the 1970s, even though significant changes in industrial structure took place during this period. This trend may reflect high entry rates of SMEs and their adaptability to changing economic conditions (Whittaker 1997:32-4).

Table 3.7 shows capital intensity, productivities and wage rates by firm size in 1957 and 1966.[9] These indicators show the basic characteristics of manufacturing SMEs in Japan. They are largely consistent with theoretical predictions concerning the relationships between these indicators and firm size.[10] Labour productivity (*Y/L*) increases with firm size. Capital intensity (*K/L*) and wage rates (ω) also rise with size, except for the smallest firm group with one to three or one to nine workers. Capital intensity (*K/L*) is largest, labour productivity (*Y/L*) is second largest, and wage rates (ω) are smallest, in terms of the differentials between firm groups by size. Capital

[9] In these two years, comprehensive data on SMEs were available, because census surveys of small- and medium-scale manufacturing enterprises were carried out by Small and Medium Enterprise Agency, Ministry of International Trade and Industry.

[10] For theoretical conditions under which SMEs can compete with LEs, see Berry and Mazumdar (1991: 52), Tajima (1978: 12-5) and Section 4.4 of this study.

productivity (Y/K) falls with size, except for small-scale firm groups with 19 or less workers in 1957 and with 29 or less workers in 1966.[11]

Table 3.7 Capital Intensity, Productivities and Wage Rates in the Japanese Manufacturing Industry by Firm Size, 1957 and 1966 (Firm Size 30-49 = 100)

	K/L [1]		Y/L [2]		Y/K [3]		ω [4]	
Firm Size [5]	*1957*	*1966*	*1957*	*1966*	*1957*	*1966*	*1957*	*1966*
1 - 3 [6]	88	111	55	44	63	40	82	113
4 - 9		98		66		67		90
10 - 19	85	95	78	84	93	88	92	95
20 - 29	90	98	91	97	101	99	100	100
30 - 49	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
50 - 99	133	118	121	107	89	90	108	105
100 - 199	185	141	141	119	77	85	117	110
200 - 299	232	164	164	135	70	83	133	115
300 - 499	343	205	201	148	59	72	142	123
500 - 999	452	261	226	168	49	64	158	154
1,000 -	779	402	265	208	34	52	208	144

Notes: 1) K/L = capital intensity
2) Y/L = labour productivity
3) Y/K = capital productivity
4) ω = wages per worker
5) Firm size in terms of the number of employees.
6) 1-3 in 1957 = firms with 1 to 9 workers

Sources: Calculated from Tajima (1978: 34) for 1957 and Motai and Ohkawa (1978: Appendix Table 1) for 1966, both of which were based on the data from Small and Medium Enterprise Agency, MITI, *Chusho Kigyo Sogo Kihon Chosa 1957, 1966* (Comprehensive Survey on SMEs 1957, 1966).

[11] Statistical irregularity for the smallest SME group is related to data reliability. In addition, this SME group includes both unincorporated (mixed-income) enterprises and incorporated enterprises. It is possible that capital for the former SMEs is overestimated because of their counting of physical assets for household purposes (Ohkawa and Kohama 1989: 108-10).

Table 3.8 Capital Intensity, Productivities and Wage Rates in Four Sectors of the Japanese Manufacturing Industry by Firm Size and Sector in 1966 (Firm Size 30-49=100)

Firm Size [5]	*Textiles*				*Chemicals*			
	K/L [1]	*Y/L* [2]	*Y/K* [3]	ω [4]	*K/L* [1]	*Y/L* [2]	*Y/K* [3]	ω [4]
1 - 3	134	44	33	91	92	32	35	80
4 - 9	117	61	52	88	69	47	67	73
10 - 19	100	83	83	97	93	77	83	92
20 - 29	102	97	95	100	102	86	84	102
30 - 49	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
50 - 99	122	104	85	106	153	111	73	108
100 - 199	137	101	74	106	175	113	65	114
200 - 299	151	123	81	113	193	151	78	116
300 - 499	188	115	61	119	317	156	49	124
500 - 999	198	115	58	122	344	188	55	137
1,000 -	200	113	57	91	505	191	38	143

Firm Size [5]	*General Machinery*				*Transportation Equipment*			
	K/L [1]	*Y/L* [2]	*Y/K* [3]	ω [4]	*K/L* [1]	*Y/L* [2]	*Y/K* [3]	ω [4]
1 - 3	112	57	51	100	102	59	58	112
4 - 9	98	76	78	94	84	77	92	98
10 - 19	98	91	93	96	96	95	99	98
20 - 29	100	98	98	98	92	108	117	98
30 - 49	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
50 - 99	112	106	95	100	102	113	110	105
100 - 199	115	111	96	104	116	127	109	107
200 - 299	138	115	83	110	141	122	86	107
300 - 499	144	142	99	118	143	133	93	112
500 - 999	152	141	93	112	173	132	76	121
1,000 -	187	156	83	106	288	263	91	153

Notes: 1) *K/L* = capital intensity
2) *Y/L* = labour productivity
3) *Y/K* = capital productivity
4) ω = wages per worker
5) Firm size in terms of the number of employees.

Source: Calculated from Motai and Ohkawa (1978: Appendix Table 1), based on the data from Small and Medium Enterprise Agency, MITI, *Chusho Kigyo Sogo Kihon Chosa 1966* (Comprehensive Survey on SMEs).

The disaggregated data for 1966 in Table 3.8 show almost the same tendency as the aggregate data in Table 3.7. There are differences in the economic performance of firms among different sectors. For example, the chemical industry shows a steeper rise in capital intensity (*K/L*) with firm size and a larger differential in it by firm size. This reflects a feature of chemical industry: major plants or factories tend to be large-scale and use capital-intensive technology. Although this kind of sector-specific difference exists, capital productivity (*Y/K*) basically decreases with firm size, while capital intensity (*K/L*), labour productivity (*Y/L*) and wage rates (ω) increase with firm size, with some anomalies in the smaller SME groups. These findings in both the aggregate and disaggregate data indicate that SMEs can coexist with LEs, by producing a unit of output with less capital but more labour than LEs (Berry and Mazumdar 1991: 52; Tajima 1978: 27).

3.3.2 Development of Subcontracting Systems after World War II

During the turmoil following World War II, large-scale machinery manufacturers in Japan could not immediately start their business activities on a full scale, because their production facilities were blocked by the Allied Occupation administration for the purpose of reparations payments and deconcentration policies. By contrast, SMEs in the machinery industry were allowed to resume operations without significant restrictions. From making parts/components for arms and machinery in response to military and investment demand before the war, they became engaged in producing consumer goods in response to growing daily needs. There were few subcontracting transactions between SMEs and LEs until the early 1950s (Fujita 1954: 150).

The Cold War shifted occupation policies from demilitarisation to economic recovery, and removed business restrictions on large manufacturers through the suspension of reparations payments and deconcentration (Kosai and Teranishi 1993: 2-3). The Korean War (1950-53) gave an impetus to the machinery industry and triggered a rapid expansion of production.

To meet this surging demand in the early 1950s, large-scale machinery manufacturers resumed contracting out their intermediate inputs to the SME sector, with the aim of: 1) saving scarce capital; 2) utilising low labour cost in a dual economic structure; and 3) coping with economic fluctuations (Mishina 1962: 86-7). [12] Subcontracting linkages reemerged in the machinery industry from the early 1950s onwards. The expected benefits of LEs from subcontracting in the early 1950s were similar to those in the 1930s. In the early postwar era, industries were confronted with difficulties in financing their investment and purchasing imported production equipment, due to tight monetary policy, credit controls and import controls (Okazaki and Yoshikawa 1993: 92-3, 98; Teranishi 1993: 139). Table 3.4 revealed large differences in wage rates between LEs and SMEs in 1950. Unstable business conditions continued and this dissuaded manufacturing firms from expanding their own production facilities.

Upon achieving economic recovery in the mid-1950s, Japan entered a period of sustained economic growth. Basic conditions of subcontracting systems drastically changed. Manufacturing firms gained better access to credit, loans and other funding from banks and financial institutions in the private and public sectors (Minami 1994:

[12] On the other hand, SMEs, which did not generally have sufficient technology, capital and human resources, found it necessary to establish subcontracting linkages with large-scale manufacturers to develop products, technologies and markets.

268-9; Okumura 1995: 911-2).[13] Since the late 1950s, structural change also took place in the labour market. Economic growth created a high demand for labour in the manufacturing industry and resulted in a shortage of labour and an increase in wages around 1960 (Minami 1973: 271-3). As shown in Table 3.4, the end of a labour surplus reduced wage differentials between SMEs and LEs in the late 1950s and early 1960s.[14] These changes further stimulated large manufacturers in the machinery industry to contract out intermediate inputs to small-medium subcontractors in order to substitute for labour, instead of capital (Hondai 1995: 82-3).

Significant changes in industrial structure in the manufacturing industry occurred during the process of economic growth. Figure 3.1 illustrates changes in the share of value added among four types of industries: 1) light industry in the production of materials; 2) light industry in the processing of semi-finished or finished products; 3) heavy industry in the production of materials; and 4) heavy industry in the processing of semi-finished or finished products. Large-scale manufacturers greatly increased the share of value added of heavy industry dealing with the processing of goods from 22 percent in 1955 to nearly 50 percent in 1975, while small- and medium-scale producers also raised it from 23 percent in 1955 to 32 percent in 1975.

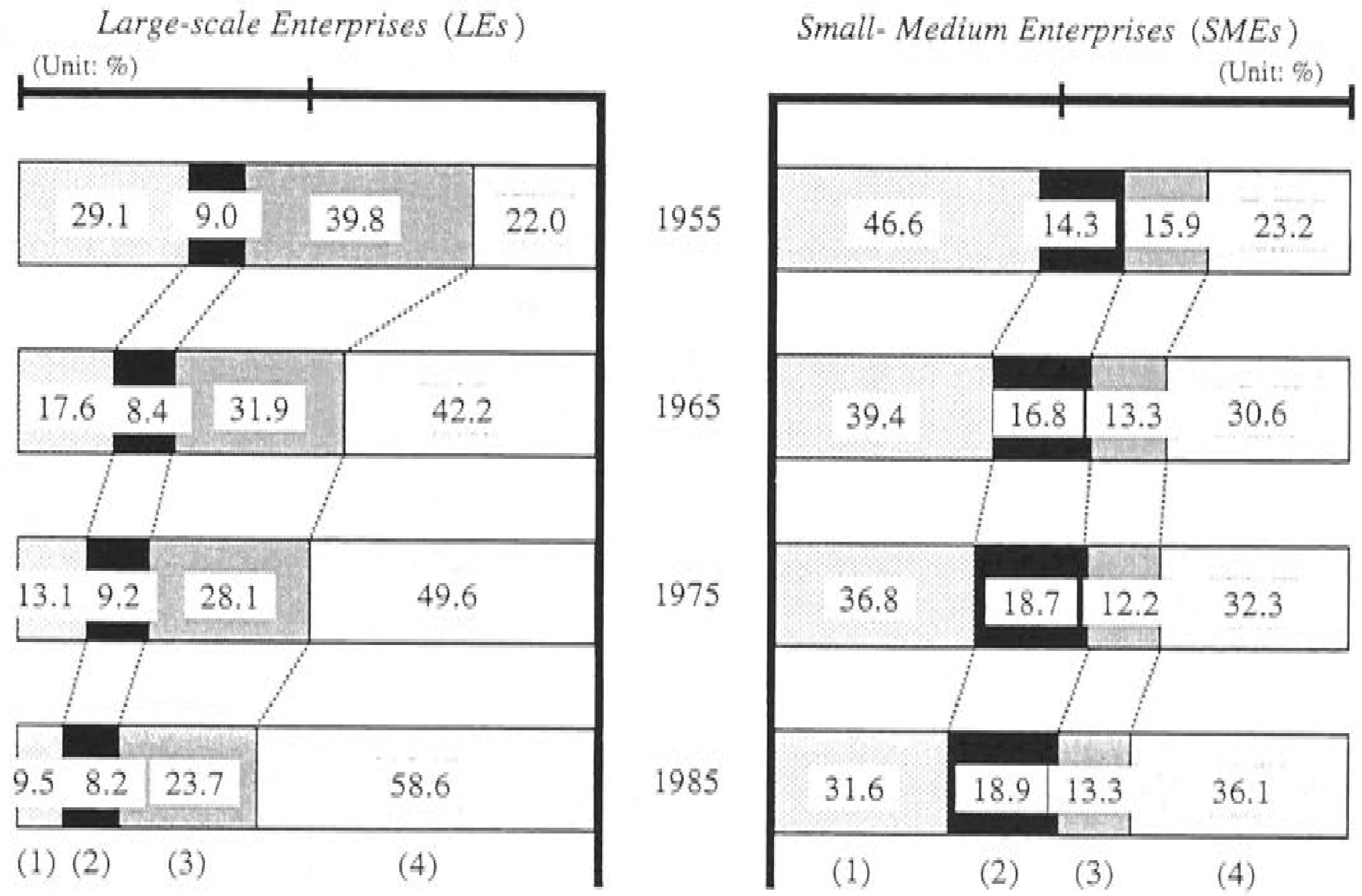
The tendency toward higher processing industrialisation in heavy industry accelerated upgrading and specialisation of production technology. Technological progress and diversification of demand increased the number of products (including parts/components) and made production processes complicated. Fierce competition in domestic and foreign markets required LEs to rationalise production processes and strengthen the division of labour. These factors for promoting a division of labour

[13] Banks and financial institutions in the private sector increased their lendings to the industrial sector from 640 billion yen in 1951 to 2.6 trillion yen in 1961, while those in the public sector increased from 13 billion yen in 1951 to 180 billion yen in 1961 (MITI 1992: 312).

[14] Despite this disappearance of labour surplus, the dual structure visible in the differences in wage levels between LEs and SMEs continued in the Japanese economy (Minami 1994: 237-51).

encouraged large manufacturers to have technically reliable subcontractors and establish efficient subcontracting networks. Large-scale machinery firms did not require subcontractors which only offered low wages, but also those which were modernised, mechanised and technologically capable.

Figure 3.1 Changes in the Share of Value Added by Industry: LEs and SMEs in the Japanese Manufacturing Industry, 1955-1985



Notes: (1) *Light industry (material-type business)*: food, textiles, lumber/wood, pulp/paper, and ceramics/stone.

(2) *Light industry (processing-type business)*: apparel, furniture/fixture, publishing/printing, rubber, plastic, and other manufacturing.

(3) *Heavy industry (material-type business)*: chemicals, oil/coal, steel and non-ferrous.

(4) *Heavy industry (processing-type business)*: metals, general machinery, electrical equipment, transportation equipment, and precision equipment.

Source: Small and Medium Enterprise Agency, MITI (1993: 249-50).

The 1957 *Economic White Paper* stated that LEs in the machinery industry could no longer remain competitive without efficient parts and components supplier firms (EPA 1957: 39-42). However, technical standards of small-medium producers were still backward in the mid-1950s and the number of SMEs capable of supplying parts of high quality in large volume on time was small, despite efforts to enhance small-medium supplier firms in the machinery sector during the interwar period (Whittaker 1997: 30). The rapid expansion of machinery demand in the 1950s could not wait until SMEs developed naturally (Mishina 1962: 87).

Under these conditions, large manufacturers in the machinery industry felt a need to give technical, financial and other support to underdeveloped small-medium supplier firms through close working relationships. LEs in the machinery industry organised vertical industrial groupings consisting of their supplier firms as an enhanced form of subcontracting linkages, which was often referred to as *keiretsu*.[15] LEs started to integrate small and medium supplier firms into vertical *keiretsu* subcontracting groupings and to foster them through the provision of various kinds of assistance. As the machinery industry grew, subcontracting systems evolved into more coordinated and cooperative production arrangements as organisational devices. From the mid-1950s onwards, Japanese SMEs became profoundly integrated into subcontracting networks and such vertical arrangements promoted the modernisation and development of SMEs (MITI 1994: 57-8).

[15] There are basically two types of *keiretsu* groupings. The horizontal *keiretsu* is a grouping of large firms across industries including the financial sector. These links are characterised as business collaboration between different sectors and intra-group mutual share holdings. This institutional device aims to enjoy scale economies within a group under the principle of one member enterprise in each business sector and avoid the risk of unfriendly takeover by other firms (Yamamura 1997: 339-41). The Vertical *keiretsu* group is formed on the initiative of assembler firms. Through this grouping, parent firms intend to strengthen ties with subcontractors without vertical integration and to ensure better functioning of subcontracting linkages. The main features of vertical *keiretsu* grouping are, 1) high dependence of member supplier firms on sales to parent firms, 2) transfer of technologies from parent firms to member supplier firms, and 3) long-term contracts between the two parties.

The proportion of subcontracting SMEs in the manufacturing industry increased consistently from 53.3 percent in 1966 to 58.7 percent in 1971, 60.7 percent in 1976 and 65.5 percent in 1981 (Small and Medium Enterprise Agency, MITI 1983: 158-9, 1998: 92-4).[16] The rising trend implies an increasingly important role of subcontracting in the Japanese economy and SME development.

Table 3.9 shows a dependence of SMEs with 299 or less workers on subcontracting transactions with large-scale manufacturers in 1971 and 1976. Around 60 percent of SMEs in the manufacturing industry acted as subcontractors. About 80 percent of such subcontracting SMEs reported that they derived 80 percent or more income from subcontracting transactions with parent firms. A particularly high proportion of SMEs engaged in subcontracting is observed in the textile, apparel, metal products, general machinery, electrical equipment, transport equipment and precision machinery sectors. Around 70 to 80 percent in 1971 and 75 to 85 percent in 1976 of SMEs in these sectors performed as subcontractors under vertical inter-firm networks. Almost 70 to 90 percent of small-medium subcontractors in these sectors supplied 80 percent or more of their total output to parent firms through subcontracting transactions. Along with SMEs in the textile and apparel sector, those in the machinery sector tended to rely very much on subcontracting arrangements as their production systems. This indicates that the machinery industry had developed under subcontracting systems during the postwar period of high growth.

[16] After the peak in 1981, the share of SMEs engaging in subcontracting business decreased to 55.9 percent in 1987 and 51.6 percent in 1996 (Small and Medium Enterprise Agency, MITI 1998: 94). By the early 1980s, many subcontracting SMEs achieved improvements in technology and productivity. Some of them acquired high and specialised technologies, while some other developed their own-brand products. As a result, SMEs tended to seek looser relationships with clients/markets. On the other hand, under the severe market conditions, LEs adopted policies to narrow SMEs down to a smaller number of competent supplier firms. These factors may explain such a decline in subcontracting ratios after the early 1980s (Small and Medium Enterprise Agency, MITI 1993: 256).

Table 3.9 Share of Japanese SMEs with Subcontracting Transactions with Parent Firms, 1971 and 1976

	Share of SMEs with Subcontracting Transactions [1] *(%)*		*Share of SMEs with Subcontracting Transactions: Specific Rate* [2] *(%)*			
			40 % or less		*80 % or more*	
	1971	*1976*	*1971*	*1976*	*1971*	*1976*
Manufacturing (only SMEs)	58.7	60.7	9.3	10.5	76.7	81.3
Size (no. of employees)						
1 - 19	59.2	61.9	8.9	9.7	78.1	82.0
20 - 49	56.9	50.4	13.8	17.9	62.1	70.3
50 - 299	47.1	51.4	15.1	21.3	58.6	73.8
Sectors						
Textiles	75.9	84.5	3.1	5.1	91.5	92.5
Apparel	71.4	83.9	6.2	6.1	83.8	89.2
Lumber and Wood	43.8	42.9	10.8	18.5	72.1	69.7
Chemicals	39.0	37.1	18.4	30.6	57.0	56.4
Iron and Steel	66.0	70.4	11.1	13.7	61.3	74.8
Metal Products	71.7	74.8	11.4	10.1	71.7	78.3
General Machinery	75.9	82.7	7.3	10.2	78.2	79.8
Electrical Equipment	79.0	82.3	6.5	8.2	80.5	85.0
Transport Equipment	77.9	86.2	6.4	5.7	81.8	88.4
Precision Machinery	70.8	72.4	8.7	7.8	78.8	86.9

Notes: 1) In the total number of SMEs with 299 or less employees, the share of SMEs that conduct subcontracting transactions with parent firms.
2) In SMEs with subcontracting deals, the share of SMEs whose rate of dependence on subcontracting transactions is less than 40 percent and more than 80 percent, respectively, in the total sales.

Sources: Small and Medium Enterprise Agency, MITI (1974: 126-67; 1979: 188-92; 1980: 156).

Table 3.10 Share of Japanese LEs which Purchased Inputs from Supplier Firms through Subcontracting Transactions, 1971 and 1976

	Share of LEs with Purchasing through Subcontracting [1] *(%)*		*Share of LEs with Purchasing through Subcontracting: Specific Rate* [2] *(%)*				*Average Number of Subcontractors per LE*	
			15% - 30 %		*30 % or more*			
	1971	*1976*	*1971*	*1976*	*1971*	*1976*	*1971*	*1976*
Manufacturing (only LEs)	82.2	84.2	19.2	19.1	13.7	11.0	88	71
Size (no. of employees)								
300 - 499	80.5	80.2	19.9	22.4	10.9	10.2	36	39
500 -	83.6	87.2	18.7	16.8	15.7	11.6	127	93
Sectors								
Textiles	86.0	88.7	18.3	13.3	4.6	2.7	51	36
Apparel	83.5	87.8	30.0	27.7	3.0	12.3	42	55
Metal Products	93.9	96.0	25.3	20.3	20.6	12.6	68	60
General Machinery	99.4	98.6	31.6	29.6	16.8	17.7	118	105
Electrical Equipment	93.7	97.8	18.2	26.4	21.8	13.8	115	85
Transport Equipment	98.0	96.3	24.9	27.8	22.9	22.4	124	136
Precision Machinery	93.8	98.0	18.4	27.1	28.9	28.1	121	123

Notes: 1) In the total number of LEs with 300 or more employees, the share of LEs that purchase input materials/parts from supplier firms through subcontracting deals.
2) In LEs with purchasing through subcontracting transactions, the share of LEs whose rate of dependence on purchasing inputs from supplier firms through subcontracting deals is 15-30 percent and more than 30 percent, respectively, in the total production cost.

Sources: Small and Medium Enterprise Agency, MITI (1974: 92-7; 1979: 78-87; 1980: 158).

Table 3.10 demonstrates the situation regarding subcontracting transactions based on responses from large-scale manufacturing firms with 300 or more employees. More than 80 percent of LEs procured intermediate inputs from their subcontractors. More than 10 percent of the LEs that employed subcontractors sourced 30 percent or more of total inputs from them. Procurement by large enterprises through subcontracting was very common in the machinery industry, including the general machinery, electrical equipment, transportation equipment and precision machinery sectors. Most notable is the transportation equipment sector, where almost all LEs purchased input materials through subcontracting, and LEs used on average 130 subcontractors. Subcontracting appears to have been an important organisational device for large-scale assembler firms, particularly in the machinery industry, in the 1970s.

Subcontracting linkages enabled LEs to obtain sufficient products at a low cost, of sufficient quality and in a timely manner, and to save precious production factors, particularly expensive labour. The Small and Medium Enterprise Agency (1980: 159) conducted a comprehensive survey in the late 1970s. It reported that the reason most frequently given by LEs for contracting out to SMEs was to take advantage of specialised technologies and specific production facilities of supplier firms. On the other hand, close subcontracting relationships with LEs allowed small-medium supplier firms to secure stable markets and acquire valuable information, knowledge, technology and other resources.

What made subcontracting an efficient and effective organisational arrangement? Yokokura (1984: 458-61) provided the following answers: 1) continuous and long-term relations between large parent firms and small-medium supplier firms; 2) competitive mechanisms within subcontracting systems; 3) technical and other support extended by large parent firms to small-medium supplier firms; and 4) government support for building effective subcontracting systems.

Long-term business relationships can encourage large parent firms to provide subcontractors with technical, financial and other types of support and, at the same time, allow small-medium supplier firms to invest in plant and equipment in coordination with parent firms.[17] To maintain such relationships, however, small and medium subcontractors were required to meet specifications given by large parent firms in terms of quality, quantity, price, delivery time and so on.

Competition between parent firms, which resulted in competition between *keiretsu* groups and further between subcontractors within each *keiretsu* group, could lead parent firms to impose stricter conditions on subcontractors. Parent firms would stop placing orders with subcontractors, if the latter could not regularly respond to the demands of the former. These circumstances created a competitive environment which encouraged supplier firms to continuously seek ways to improve their technological and other capabilities.

Parent firms have provided subcontractors with technical, marketing and financial support. This enabled LEs to integrate capable SMEs in their subcontracting networks and improve the efficiency of their subcontracting production systems.

The Japanese government also assisted industries in improving environments for subcontracting relationships between LEs and SMEs. With regard to the modernisation of subcontractors, the 1956 *Law concerning Temporary Measures for the Promotion of the Machinery Industry* (*Kikai Kogyo Shinko Rinji Sochi Ho*) played an important role in modernising production facilities of metalworking and machinery SMEs, particularly small-medium auto parts producers, through directed credit with low interest rates.[18] The 1970 *Law on the Promotion of Subcontracting Small and Medium Enterprises* (*Shitauke Chusho Kigyo Shinko Ho*) encouraged small- and medium-scale

[17] The Small and Medium Enterprise Agency (1977: 172) reported that only one fifth of subcontracting SMEs reduced the dependence of their sales on the largest parent firm or replaced the largest customer for four years between 1974 and 1977. This illustrates the existence of continuous subcontracting relationships between LEs and SMEs.

[18] Odaka (1996) evaluated the effects of the 1956 *Law concerning Temporary Measures for the Promotion of the Machinery Industry*. MITI (1990: 551-87) explained the history, measures, performance and effects of the law comprehensively.

subcontractors to modernise production facilities and carry out joint operations.[19] To prevent LEs from abusing their disproportionate power, the 1956 *Law on the Prevention of Delay in the Payment of Subcontracting Charges and Related Matters* (*Shitauke Daikin Shiharai Chien-to Boshi Ho*) worked as a means of ensuring fair transactions between large-scale parent firms and small-medium subcontractors.[20] These policies helped strengthen the functioning of subcontracting systems in the private sector.

During a decade from the mid-1950s, Japanese policy makers and scholars often argued that the "dual structure" issue was a problem generated by the power imbalance between large parent firms and small-medium supplier firms (e.g., Broadbridge 1966; Kiyonari 1997: 67-95; MITI 1994: 56-9).[21] Under the dual structure, subcontracting SMEs had to accept subordinate relationships with large-scale parent firms. However, SMEs gradually overcame such one-sided relationships with LEs, by improving quality and productivity through investment in plants and equipment and acquisition of production and other technology, in the process of high growth during the 1960s (Nakamura 1994: 247-51). As Kiyonari (1997: 127-30) pointed out, the subordinate and exploitative nature of subcontracting faded away in the 1960s and 1970s and the inter-firm relationships between LEs and SMEs became more cooperative. Despite the existence of a dual structure, as discussed above, Japanese subcontracting evolved as a useful organisational device for the promotion of specialisation and contributed to the development of SMEs in the manufacturing industry.

---

[19] For details of the law, see MITI (1993: 387-91).

[20] The government was entitled to instruct LEs in violation of the law to redress unfair transactions with SMEs. MITI (1991: 110-6) explains this law in detail.

[21] The term "dual structure" was first used by Arisawa in 1956 and then by the *1957 Economic White Paper*, which popularised the idea that SMEs were inferior to LEs and subject to the controls by LEs through subcontracting arrangements. See, for example, Friedman (1988: 244-5) and Kosai (1994: 207-11).

As observed before, after reaching a peak in the early 1980s, the proportion of subcontracting SMEs in Japan gradually declined, whereas that of independent SMEs steadily rose. This change may suggest that the roles and effectiveness of subcontracting linkages vary according to the stages of economic development, the development of the industrial sector, and the maturity of SMEs. Japan's experience implies that subcontracting can play a more active role in fostering the SME sector and increasing the efficiency of the manufacturing industry at earlier stages of economic development than at later stages. The development of SMEs and economies may make market transactions on a spot-basis more feasible and economical than subcontracting transactions. In addition, SMEs do not necessarily require substantial support from LEs through subcontracting ties, if they develop and acquire necessary capabilities such as technology, marketing, management and finance to a sufficient degree.

3.3.3 Subcontracting in the Machinery Industry

Table 3.9 indicated that dependence of SMEs on subcontracting was much more significant in the machinery industry than in other industries. Why was this, and what were the main features of subcontracting in the machinery industry? The Small and Medium Enterprise Agency of MITI (1980: 160-3, 1983: 160-2) explained the basic characteristics of subcontracting relationships between LEs and SMEs in the following way, by looking at some of the typical subsectors in the machinery industry, such as electrical home appliances, shipbuilding and automobile subsectors.

In the electrical home appliances subsector, there existed 1) large-scale electrical manufacturers as assembler firms, 2) specialised parts manufacturers as finished parts producers, and 3) smaller supplier firms as subcontractors under specialised parts manufacturers. Due to the standardisation of parts and components, assembler firms and specialised parts supplier firms tended to have relatively loose relationships. On the other hand, specialised parts producers had many small subcontractors that undertook simple processing activities such as press/stamping, plating, painting and plastic molding.

Mishina (1962: 104) reported that Matsushita, Sanyo and Sharp had approximately 570, 190 and 70 subcontractors, respectively, in 1960. Since these numbers represented only direct subcontractors, the total number including second-tier and lower-tier supplier firms would have been substantially higher. These assembler firms in the electrical home appliances industry used to manufacture main parts and components in-house. However, as the number of parts required to complete products increased in the 1950s and the 1960s, assembler firms increasingly felt the need to contract out parts production and processing to supplier firms.

In the shipbuilding subsector, assembler firms constructed ships by organising subcontractors, which were divided into two types according to the work undertaken and the location of their operations. Outside subcontractors produced or processed parts and components including engine parts, propellers and outfits at their own production facilities, whereas in-house subcontractors conducted jobs such as welding, painting and piping work inside assemblers' shipyards through the provision of manpower. Assembler firms had a large number of these small-medium subcontractors. In general, SMEs supplying parts and components were not significantly dependent on a limited number of shipbuilders, while in-house-type subcontractors located in shipbuilding towns often relied heavily on specific assembler firms.

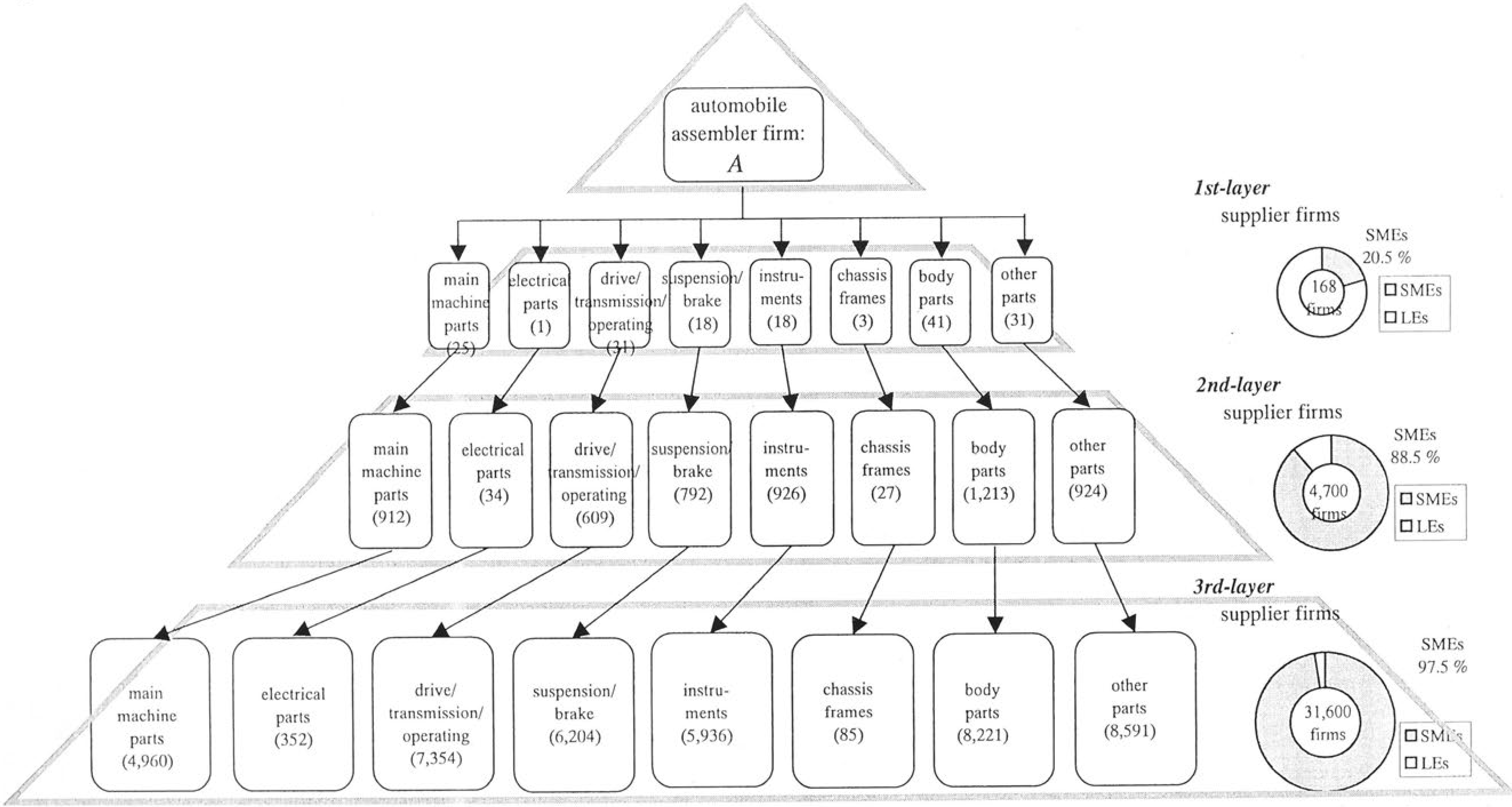
Since business conditions were unstable in the shipbuilding industry, parent firms used subcontractors as a buffer against fluctuations in demand. At the same time, the shipbuilding industry needed to keep certain technical standards to compete in international markets, even though technological levels in this industry were not very high compared with, for example, the automobile industry. Therefore, shipbuilders tended to grade subcontractors in terms of technology, facilities and management and foster and utilise them differently (Mishina 1962: 96-9).

In the automobile subsector, one assembler firm and a large number of supplier firms formed a pyramidal structure through subcontracting networks.[22] First-tier subcontractors usually produced finished and complicated parts or components, whereas the majority of second-tier and lower-tier subcontractors often engaged in material processing activities, such as machining, press/stamping, casting, forging, plating, surface treatment and dies/mold making. Some of the large-scale automobile manufacturers adopted the "key subcontractor" system, in which they assigned their selected first-tier subcontractors to contract out to second-tier or lower subcontractors and supervise such subcontracting business. According to the example given in Figure 3.2, one large-scale automobile assembler firm at the top of the hierarchy employed 168 first-layer, 4,700 second-layer and 31,600 third-layer supplier firms in 1977. Large numbers of SMEs were integrated into such multi-layer pyramidal structures, where the firm size became smaller down the hierarchy of subcontractors. This hierarchical structure of subcontracting systems, which is known as vertical *keiretsu* groupings, indicates the existence of a huge number of smaller supplier firms at the bottom of the pyramid as well as the extent of the inter-firm division of labour.[23]

[22] The prototype of vertical subcontracting linkages emerged in the Japanese automobile industry in the second half of the 1930s, when the government promoted the production of cars mainly for military purposes. After World War II, subcontracting transactions between automobile assembler firms and parts supplier firms became more prominent in response to the growing demand for vehicles during the Korean War (1950-53) (Kamiyama *et al.* 1995: 258-60).

[23] During the 1956-57 economic boom, small-medium parts supplier firms failed to meet the volume of orders from assembler firms. This triggered the start of vertical *keiretsu* groupings. Automobile assembler firms sought to establish closer relationships with parts producers and ensure the supply of a necessary quantity of parts and components (Okumura 1960: 326-33).

Figure 3.2 Structure of Multi-layer Subcontracting Networks in Japan: An Automobile Assembler Firm in 1977



Note: Figures in the parenthesis indicate the number of supplier firms. The total number of supplier firms in the pie charts exclude the number of firms that supply to 2 or more higher-layer firms.

Source: Small and Medium Enterprise Agency, MITI (1977: 168-9).

As shown in Table 3.6, the Japanese automobile industry developed rapidly in the 1950s and 1960s. In addition to the rapid expansion of demand and the considerable increase in plant and equipment investment by assembler firms, the vertical subcontracting system illustrated in Figure 3.2 contributed to the significant growth in car production during that period (Mishina 1962: 87-8; Small and Medium Enterprise Agency, MITI 1977: 167). The "just-in-time (JIT)" system adopted by automobile assembler firms in the early 1960s improved the quality, quantity and efficiency of car manufacturing (Kamiyama *et al.* 1995: 266).[24] The production of only necessary parts/components in a necessary quantity at a necessary time required assembler firms to organise not only their own factories but also their supplier firms from the first-layer to the bottom. Without the modernisation and rationalisation of supplier firms, the JIT system does not work well and the efforts made by assembler firms themselves are unlikely to yield fruit. To establish an effective JIT system, it is necessary to improve the levels of technology and productivity of supplier firms. This is the main reason why tightly knit relationships between large-scale assembler firms and small-medium subcontractors emerged in the Japanese automobile industry.

3.3.4 Is Subcontracting in Japan Unique?

It can be asked whether Japan's experience with the evolution of SMEs and subcontracting systems is unique. Some scholars have given a socio-cultural explanation for Japanese subcontracting. Dore (1987: 169-73) argued that relational or obligational contracting is dependent on the benevolence, loyalty and goodwill

[24] The JIT production system was originally developed by Toyota and has been utilised by many other assembler firms.

observed in Japanese culture.[25] These cultural features in Japan may reduce transaction costs associated with subcontracting more significantly than in other economies. Intimate and long-term trading relationships based on mutual goodwill tend to prevent business participants from using opportunistic behaviour and promote successful subcontracting business. Similarly, Tsutomu Nakamura (1983: 53-4) attributed the successful development of subcontracting systems in Japan to group consciousness, loyalty and mutual trust. He stated that these factors tended to be nurtured in the Japanese social context, where individualism was weak, groupism (or group mentality) was strong, and vertical (or paternalistic) human relationships were easily accepted.

Comparing customer-supplier relationships in the British and Japanese electronics industries, Sako (1992: 241-5) found that obligational contractual relations (OCR) or subcontracting linkages were more often observed in the latter than in the former. She explained that the key conditions for establishing OCR or subcontracting ties were the creation of contractual trust, competence trust and goodwill trust.[26] According to Sako, contractual trust already existed in Britain, while the other two types of trust did not. Competence trust can be established by better training and retraining of the British workforce. However, goodwill cannot easily be created because it is based on national culture. Sako stated that the willingness to be indebted to someone and to recognise high mutual dependence may appear more easily in less individualistic Japan than in Britain.

---

[25] Relational or obligational contracting means subcontracting, or continued contracting associated with close relations between two parties. It is conceptually opposite to spot contracting or arm's-length contracting. Benevolence is defined as something shown in paternalistic relations between unequal parties, by superior to inferior, which is usually the reciprocal of loyalty. Goodwill is defined as the sentiments of friendship and the sense of diffused personal obligation that occur between parties engaged in continued contractual economic exchange (Dore 1987: 170).

[26] According to Sako (1992: 37-40), contractual trust may exist in the situation where business participants adhere to specific written or oral agreements (promises). Competence trust refers to the expectation that a trading partner can perform its role competently. Goodwill trust is defined as mutual expectations of open commitment to each other. This commitment is the willingness to do more than is formally expected.

Such cultural specificity has certainly existed in Japan. However, Dore (1987: 186-7) noted that close and long-term business relationships are not unique to Japanese industry. Piore (1990: 283-6) stated that the U.S. manufacturing industry promoted subcontracting transactions since the 1970s, following Japanese practices. He found that large-scale assembler firms in the U.S. during the 1970s and 1980s tended to:

(1) reduce the number of subcontractors and develop closer and long-term relationships with those selected supplier firms;
(2) have close coordination in terms of delivery timing through the introduction of the JIT (just-in-time) system;
(3) establish collaborative relationships with subcontractors in the area of product design; and
(4) encourage employees to establish their own companies as subcontractors.

Nishiguchi (1994: 212-4) found in the electronics industry that the Japanese subcontracting system was transplanted by Japanese-affiliated assembler firms operating in Britain and basically accepted by British supplier firms. Although British subcontractors did not share common social and cultural characteristics with Japanese businesses, they understood that the high quality and low cost which could be realised through subcontracting were beneficial to not only customers but also supplier firms. Nishiguchi suggested that the principles of subcontracting are applicable to a degree to cultures outside Japan, if non-Japanese firms can perceive subcontracting as economically beneficial production systems. Sako (1992: 244-5) also argued that goodwill trust between two parties necessary to establish useful subcontracting linkages can be deliberately cultivated to some extent, by choosing trading partners carefully and by having frequent and intense communications.

Japan's cultural specificity appears to have special factors in favour of the establishment and functioning of subcontracting systems. Is it difficult or impossible for countries without Japanese-type culture to initiate and make use of subcontracting production systems? As discussed above, it seems possible that even countries which do not share common cultural features with Japan develop subcontracting systems to a different degree, if subcontracting proves beneficial to respective economies. Nishiguchi and Brookfield (1997: 100) indicated that a trend emerged among many Western producers to follow Japanese subcontracting practices. Therefore, Japan's experience will provide other economies with some relevant lessons concerning the development of subcontracting systems.

3.4 Subcontracting Linkages as Support Mechanisms for SMEs in Japan

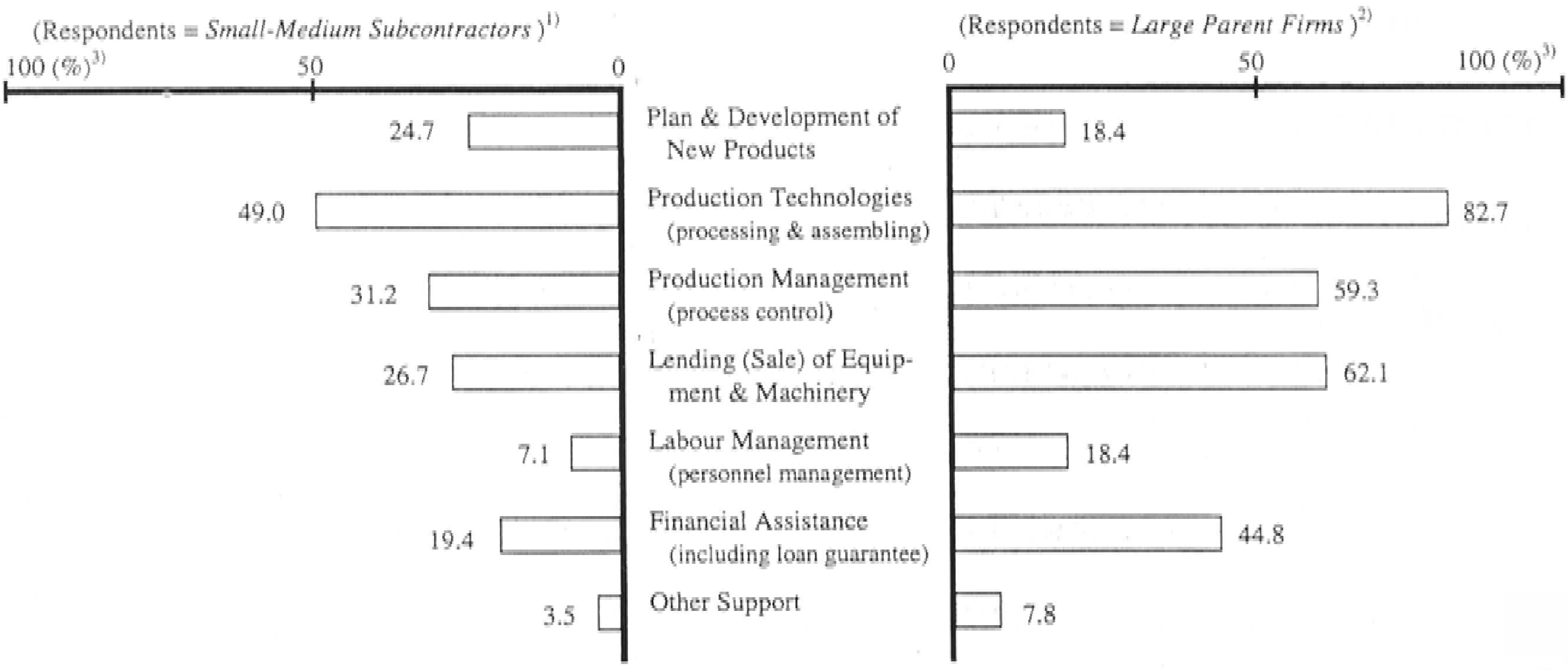
Large-scale parent firms traditionally cited low wage rates, capital- or labour-saving and a buffer against fluctuations in demand as benefits of subcontracting. In the postwar period of high economic growth, LEs expected SMEs to function not only as cheap input sources and shock absorbers but also as competent producers with high productivity and specialised technology. However, not many SMEs could satisfy the needs of LEs until the mid-1950s. Accordingly, LEs had to enhance the capabilities of SMEs through the provision of support and guidance in order to increase their own efficiency of production and improve their competitiveness in domestic and international markets.

Figure 3.3 shows the types of support provided through subcontracting linkages in the mid-1970s, based on responses to survey questions from subcontractors and parent firms. The answers show quite similar results, even though the percentages based on responses from parent firms are higher than those from supplier firms.[27] Subcontractors responded that transfer of production technologies and production management, lending of production equipment and machinery, and the development of new products were the main areas of assistance extended by large-scale parent firms. Support from parent firms was concentrated on technology-related matters. Figure 3.4 confirms that parent firms were the largest source of technology for SMEs. In the early 1980s, more than half of the SMEs in Japan acquired technologies from principal firms through subcontracting linkages.

Table 3.11 lists characteristics of support extended by four large-scale manufacturers to their small-medium supplier firms under subcontracting ties in the late 1950s. Automobile assembler firms Mitsubishi, Nissan and Toyota, and agricultural machinery firm Kubota, all organised a large number of *keiretsu*-member and non-*keiretsu*-member subcontractors in the late 1950s, the initial stage of high economic growth in Japan. The four manufacturers had similar subcontracting policies, which aimed to foster supplier firms and integrate the latter into the former's production structures.

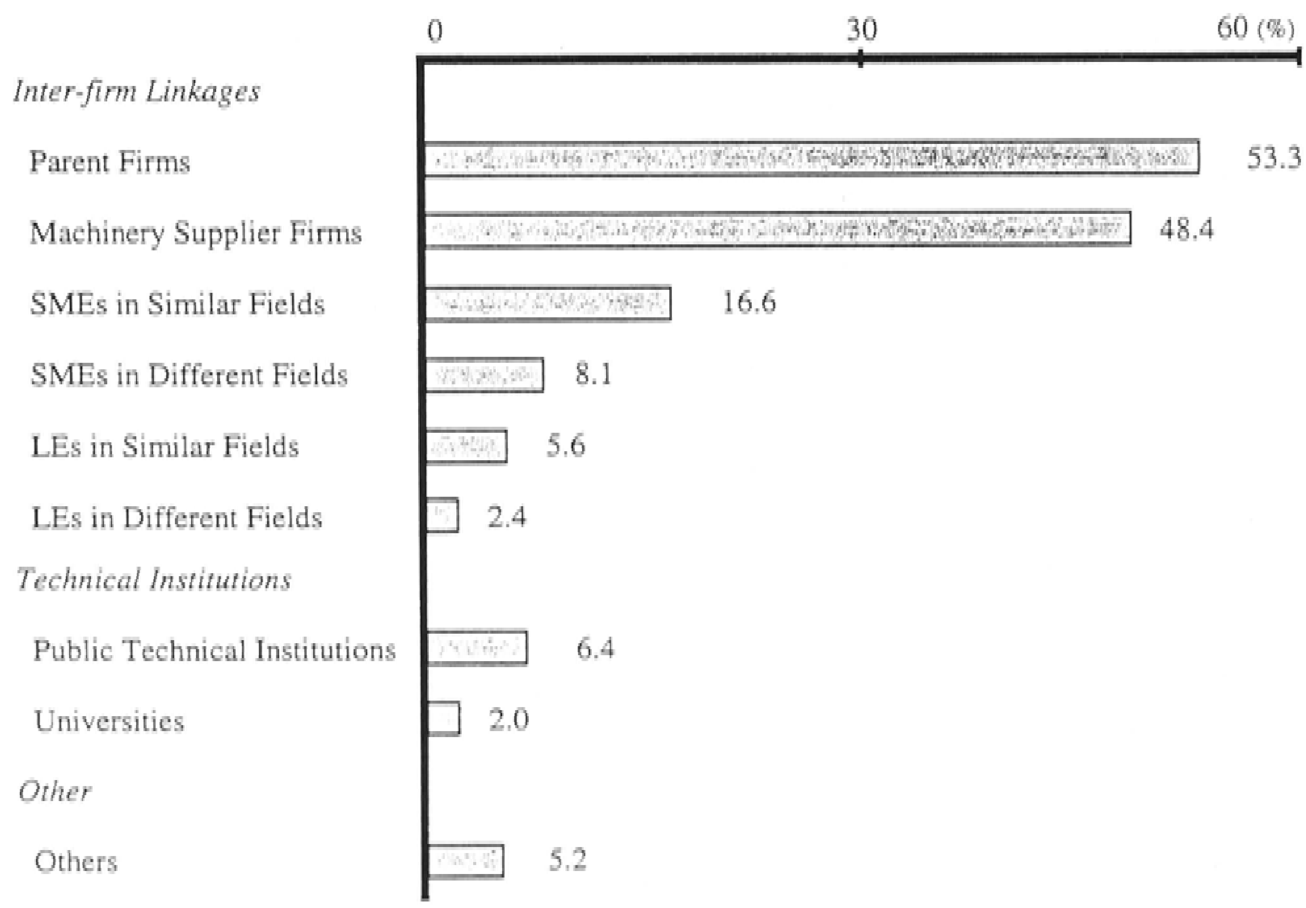
[27] This is because parent firms in the survey were limited only to listed companies, which would generally be larger and more capable of assisting supplier firms than parent firms on average.

Figure 3.3 Assistance Extended by Large Parent Firms to Small-Medium Subcontractors in the Japanese Manufacturing Industry in 1977



Notes: 1) Based on responses from small-medium subcontractors with respect to assistance extended by large parent firms through subcontracting linkages.
2) Based on responses from large parent firms with respect to assistance extended to small-medium subcontractors through subcontracting linkages. Parent firms here are limited only to listed companies.
3) The total exceeds 100 % because of multiple answers.
Source: Small and Medium Enterprise Agency, MITI (1977: 174).

Figure 3.4 Sources of Technologies for SMEs in Japan in 1984



Note: The total exceeds 100 % because of multiple answers.
Source: Small and Medium Enterprise Agency, MITI (1985: 187).

Table 3.11 Support from Parent Firms through Subcontracting Linkages: the Japanese Automobile and Agricultural Machinery Subsectors in the Late 1950s

	Mitsubishi	*Nissan*	*Toyota*	*Kubota*
Products	· vehicles	· vehicles	· vehicles	· agricultural machinery, diesel engine
No. of Factory Workers	· 4,000 workers	· 7,500 workers	· 5,500 workers (excl temporary workers)	· 1,500 workers
Production/month	· 600 million yen	· 5,000-6,000 million yen	· 7,000-8,000 million yen	· 1,200 million yen
Contract-out Ratio	-	· 70%	· 70%	· 52-53 %
No. of Supplier Firms	· 180 supplier firms · 52 firms (member of Mitsubishi supplier association)	· 800 supplier firms · 120 firms (member of Nissan supplier association)	· 800 supplier firms · 150 firms (member of Toyota supplier association)	· 130 supplier firms · 70 firms (highly-dependent on Kubota)
Policies for Subcontracting	· to establish mutual trust through technical/financial support · to develop specialized suppliers	· to foster members of the Nissan supplier association in order to ensure stable production and reduce costs	· to contract out adequate parts to suitable supplier firms	· to closely link supplier firms to Kubota's production structure
Technical Support	· positive provision of technical support to supplier firms	· dispatch of experts to suppliers · enhancement of supplier association's role in technical support	· technology upgrading and cost reduction through expert dispatch and training by purchase dept. and association	· dispatch of technical staff to suppliers
Financial Support	· provision of loans for supplier firms · supply of used machines at low cost	· provision of supplier firms with loan guarantees	· consideration of each case on demand	· introduction of supplier firms to banks
Supply of Input Materials	· provision of casting/forging materials without cost · supply of other materials at cost	· supply of materials at cost · provision of drawings	· supply of materials required for quality or safety reasons · supply of drawings · provision of tools if necessary	· supply of materials related to quality problem without cost · supply of materials to new suppliers at cost
Price Setting	· negotiation on prices based on suppliers' cost breakdown and cash flow	· use of prices based on Nissan's cost breakdown · review of price levels every 3 month	· negotiation of prices · renew of contract every 6 month	· negotiation of prices based on suppliers' cost breakdown
Managerial Support	· provision of managerial guidance by the dispatch of Mitsubishi's retired employees · use of supplier association as an opportunity to improve managerial skills	· provision of managerial lectures through Nissan supplier association	· provision of managerial support through Toyota supplier association · provision of managerial assistance looking at suppliers' internal documents	-

Source: Takeuchi (1962: 26-7, 31-3).

All large manufacturers actively provided supplier firms with technical support and guidance through subcontracting relationships. Such support mainly took the form of dispatching technical experts or engineers and offering training courses. In addition to assembler firms themselves, associations of supplier firms in each assembler *keiretsu* group assisted in improving technological capabilities of subcontracting SMEs. Large principal firms extended financial assistance to their subcontractors in different ways. Mitsubishi directly provided supplier firms with loans and used equipment, while Kubota introduced subcontractors to banks and financial institutions. The parent firms in the table tended to provide their supplier firms with raw materials and intermediate inputs, particularly those required for quality or safety purposes. They generally offered subcontracting SMEs opportunities to discuss price levels based on cost breakdowns, and to review contracts periodically. Automobile manufacturers also made efforts to improve the managerial capabilities of subcontractors through lectures, seminars or training programs organised by each *keiretsu* association.

Itoh and Urata (1998) conducted a case study on the technological development of SMEs in the Japanese auto parts industries based on an interview survey in the early 1990s. They selected Ohta city in Gunma prefecture as one of their cases, where Fuji Heavy Industries produces Subaru cars. A large number of small-medium metalworking and machinery firms were engaged in producing auto parts and components.

Table 3.12 Channels and Effectiveness of Technology Support Mechanisms for Auto Parts SMEs in Ohta City, Gunma Prefecture, Japan in the Early 1990s

Channels	*User Firms* (*N* = *33* [1)])		*Differences in No. of* User Firms by Size	*Mean Scores* of Effectiveness		*Differences in Mean* Scores by Size
	No. of Firms [2)] (%)	*Rank*	*Size* [3)] *p-values*	*Mean* [4)] (s.d.)	*Rank*	*Size* [5)] *F-values*
1. Parent Firms	24 (72.7)	1	0.10 * (+)	3.25 (1.29)	4	1.25
2. Equipment Suppliers	21 (63.6)	2	0.94	3.90 (1.41)	2	0.18
3. Public Technical Institutions	6 (18.2)	4	0.80	3.83 (1.60)	3	0.40
4. Firms in Similar Businesses	11 (33.3)	3		2.91 (1.64)	6	
5. Technical Literature	4 (12.9)	6		1.75 (1.50)	7	
6. Industrial Associations	5 (16.7)	5		3.20 (1.48)	5	
7. Universities	3 (9.4)	7		4.33 (0.58)	1	

Notes: 1) The number of respondents with respect to technical literature, industrial associations and universities is not 33, but 31, 30 and 32, respectively.
2) Figures in the upper row indicate the number of firms which utilise each channel. Figures in parentheses are the share of firms with each channel in the total sample firms.
3) Differences in frequency ratios between firms with 1-9, 10-19, 20-50, and 51≤ workers, which are indicated by *p*-values of Pearson's chi-square test. *** = significant at the 1 % level, ** = significant at the 5 % level, * = significant at the 10 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.
4) Figures in the upper row are the average of scores indicated by firms' rating from 1 (not at all effective) to 5 (very effective). Figures in parentheses are standard deviation.
5) Differences in mean scores of effectiveness between firms with 1-9, 10-19, 20-50, and 51≤ workers, which are indicated by *F*-values of ANOVA. *** = significant at the 1 % level, ** = significant at the 5 % level, * = significant at the 10 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

Source: Calculated from Itoh and Urata (1998: 338-9).

Table 3.12 summarises the results of their interview survey involving 33 machinery SMEs in Ohta. More than 70 percent of the firms received technical support from parent firms through subcontracting. The difference between firms according to size in the share of SMEs with technical assistance from parent firms is statistically significant at the 10 percent level. Smaller SMEs relied more on this form of support than larger SMEs. The effectiveness of this source of technology was deemed to be high, with an average score of 3.25 on a scale of 1 (ineffective or not useful) to 5 (effective or useful). More than 60 percent of the sampled SMEs received technology support from machinery and equipment suppliers. This channel was evaluated at a high 3.90. One-third of the respondent SMEs utilised another inter-firm linkage, peer firms in similar lines of business, to upgrade the technical capabilities. Despite a high appreciation for the support provided by public technical institutions and universities, these were less frequently cited as sources of technology. This case study indicated that inter-firm linkages in the private sector, particularly subcontracting ties, enhanced the access of auto parts supplier firms to technological support and guidance.

As observed above, subcontracting linkages enhanced access of SMEs in the Japanese manufacturing industry, particularly in the machinery sector, to various forms of mutually beneficial assistance, based on the need for parent firms to improve the efficiency of the production processes as a whole. This suggests that subcontracting linkages themselves may have built-in support mechanisms for SME development.

3.5 Subcontracting and Productivity of SMEs in Japan

During the 1950s, 1960s and 1970s, subcontracting arrangements re-emerged and developed as an important production system in the Japanese manufacturing industry. Large-scale manufacturers extended technical and other support to small and medium supplier firms in order to stimulate the latter to upgrade their capabilities and to enable the former to improve efficiency. Did these subcontracting production systems indeed improve the productivity of SMEs?

Urata (1995) examined technological progress in manufacturing SMEs during 1966-72. He estimated total factor productivity (TFP) growth on the basis of MITI's Census of Manufactures. Table 3.13 summarises the results of technological progress as measured by TFP growth and its contribution to the growth of value added according to firm size. During 1966-72, TFP in the manufacturing industry as a whole grew at the rate of 1.3 percent annually, which accounted for 12 percent of the annual average growth rate of real value added. The average growth rate of TFP for SMEs with 20 to 299 workers was 1.24 percent per annum, which was marginally higher than that for LEs with 300 or more employees. SMEs with 100 to 299 employees showed the highest TFP growth rate. These findings suggest that SMEs, particularly larger SMEs, played a positive role in promoting technological progress in the Japanese economy at the time. By sector, the machinery industry, especially electrical equipment, general machinery and transportation equipment sectors, recorded remarkable TFP growth. SMEs in these sectors also showed relatively high TFP growth.

Subsequently, Urata (1995) investigated factors behind differences in TFP growth rates between different groups of firms according to size. As shown in Table 3.14, TFP growth in 50 sectors (ISIC 2- and 3-digit levels) by size is regressed on: 1) the share of engineers in total employees; 2) the share of firms with industrial patents; 3) the share of firms with export business; 4) the share of LEs that contract out work to supplier firms; and 5) the share of SMEs that carry out subcontracting transactions with parent firms. The regression analysis indicates that independent variables related to subcontracting are statistically significant at the 5 percent level with an expected positive sign. Based on the results, subcontracting ties with parent firms increased TFP for small-medium supplier firms, while purchasing from supplier firms through subcontracting transactions raised TFP for large-scale manufacturers. Urata (1995: 26) concluded that subcontracting contributed to technological progress in the Japanese manufacturing industry, due to technology transfer from large-scale parent firms to small-medium subcontractors as well as the promotion of a division of labour between LEs and SMEs.

Table 3.13 Total Factor Productivity (TFP) Growth and the Ratio of TFP Growth to Value Added Growth in Japanese Manufacturing SMEs and LEs, 1966-1972 (Percentages)

	SMEs 20-299 [1]								*LEs* [1]		*All* [1]	
	20-49		*50-99*		*100-299*		*20-299*		*300-*		*20-*	
	(1)[2]	(2)[3]	(1)[2]	(2)[3]	(1)[2]	(2)[3]	(1)[2]	(2)[3]	(1)[2]	(2)[3]	(1)[2]	(2)[3]
Manufacturing	1.19	13.1	1.09	11.4	1.34	12.2	1.24	12.4	1.20	10.5	1.30	11.9
Food	-0.43	-6.6	-0.79	-9.9	0.07	0.8	-0.29	-3.6	3.58	28.0	1.87	17.5
Textiles	2.15	40.0	-6.77	113.8	2.75	32.3	0.15	3.9	4.64	59.2	2.58	42.7
Apparel	0.33	4.0	2.54	21.3	3.49	22.8	2.06	17.4	0.91	5.5	1.86	14.6
Lumber/Wood	0.61	12.2	1.37	20.5	0.16	2.1	0.68	11.1	2.93	18.4	1.25	15.1
Pulp/Paper	2.30	26.6	0.85	11.0	2.47	29.8	2.06	25.0	-0.64	-10.1	0.49	7.0
Chemicals	-4.11	-35.8	-3.17	-29.0	-0.35	-3.3	-1.39	-12.9	-0.63	-7.6	-0.65	-7.4
Rubber	5.07	42.3	1.45	10.6	1.69	24.2	2.77	26.6	0.90	10.2	1.27	13.9
Ceramics	2.54	17.6	1.89	17.0	2.79	25.7	2.53	20.8	2.17	23.2	2.43	23.0
Iron and Steel	-0.70	-9.0	-1.40	-16.6	1.45	10.7	0.06	0.6	-0.62	-6.2	-0.43	-4.3
Non-ferrous	-2.56	-38.1	-1.90	-21.1	1.85	16.6	-0.16	-1.7	-1.34	-13.5	-1.08	-11.0
Metals	1.34	11.8	2.55	23.1	0.56	4.4	1.41	12.0	3.39	22.6	2.12	16.6
General Machinery	2.40	23.5	1.91	19.0	2.49	23.5	2.32	22.4	4.15	29.2	3.35	27.0
Electric Machinery	1.49	12.1	0.91	7.2	2.25	15.2	1.70	12.5	5.44	34.9	4.66	30.6
Transport Equipm't	3.25	30.6	2.81	30.0	1.79	17.9	2.43	24.3	1.27	11.8	1.51	14.1
Precision Machinery	1.71	24.5	1.03	14.8	2.47	18.5	1.91	19.7	-0.71	-6.5	0.28	2.7

Notes: 1) Firm size in this table is in terms of the number of workers.
2) Annual average TFP growth rate estimated on the basis of a translog production function.
3) Ratio of annual average TFP growth rate to annual average value added growth rate.
Source: Urata (1995: 13, 15).

Table 3.14 Determinants of TFP Growth in Japanese Manufacturing SMEs and LEs, 1966-1972

	SMEs 20-299 1)		*LEs 300-* 2)	
	(1)	(2)	(3)	(4)
Constant	-2.25	-3.43 *	-2.87	-1.72
	(-1.51)	(-2.40)	(-1.28)	(-0.80)
Engineers 3)	-9.16		0.90	
	(-1.43)		(0.27)	
Patents 4)		-0.55		-4.75 *
		(-0.13)		(-2.02)
Contract-out 5)	2.89	2.28	4.88 *	5.76 *
	(1.56)	(1.23)	(2.12)	(2.58)
Subcontracting 6)	4.82 *	2.13 *		
	(2.03)	(2.15)		
Export 7)	2.40	2.03	1.69	3.67
	(0.95)	(0.71)	(0.71)	(1.52)
R^2	0.302	0.272	0.108	0.178

Notes: 1) The dependent variable for regression models of (1) and (2) is the average annual TFP growth rate for SMEs with 20-299 workers during 1966-72. Figures in parentheses are *t*-values. * indicates significance at the 5 % level.
2) The dependent variable for regression models of (3) and (4) is the average annual TFP growth rate for LEs with 300 or more workers during 1966-72. Figures in parentheses are *t*-values. * indicates significance at the 5 % level.
3) The share of engineers in the total employees in 1971.
4) The share of firms with industrial property right in 1971.
5) The share of firms that contract out goods/services to supplier firms in 1971.
6) The share of firms engaged in subcontracting with parent firms in 1971.
7) The share of firms with export business in 1971.

Source: Urata (1995: 25).

Hondai (1992) also estimated productivities of SMEs with 30 to 299 employees and LEs with 300 or more employees in the Japanese manufacturing industry during 1965-82, based on MITI's Census of Manufactures. He analysed factors which had a positive impact on increases in productivity of SMEs. Table 3.15 shows the average annual growth rates of labour productivity and TFP of the 15 sectors. The machinery industry, including general machinery, electrical machinery, transportation equipment and precision machinery sectors, which Hondai identified as having intense subcontracting relationships between SMEs and LEs, shows a higher rate of TFP growth and a higher proportion of such TFP growth to labour productivity growth than other sectors such as food, lumber/wood and ceramics, which had weaker subcontracting ties between SMEs and LEs.

Table 3.15 Labour Productivity Growth and Total Factor Productivity Growth in Japanese Manufacturing SMEs and LEs, 1965-1982 (Percentages)

	Gy [1]		*GR* [2]		*GR/Gy* [3]	
	SMEs [4]	*LEs* [5]	*SMEs* [4]	*LEs* [5]	*SMEs* [4]	*LEs* [5]
Food	5.7	3.4	-0.2	-1.5	-2.8	-44.1
Textiles	7.9	6.4	4.0	1.9	50.7	29.5
Apparel	4.7	4.6	1.8	1.8	38.0	39.6
Lumber/Wood	5.7	5.5	0.5	0.9	4.9	17.0
Pulp/Paper	6.7	4.8	1.6	-0.2	24.0	-4.7
Chemicals	9.0	8.0	3.1	2.6	34.2	32.9
Rubber	6.5	7.2	2.0	0.9	30.7	13.0
Ceramics	6.2	6.0	0.6	1.4	9.9	22.9
Iron and Steel	7.3	7.8	2.3	2.6	31.0	32.9
Non-ferrous	7.7	6.9	2.6	1.8	34.0	26.3
Metals	7.3	7.7	2.4	2.8	32.7	36.1
General Machinery	8.1	8.3	4.2	4.3	51.6	51.3
Electric Machinery	9.9	11.5	5.9	5.9	60.0	51.3
Transport Equipment	9.8	9.2	4.9	3.5	49.7	38.2
Precision Machinery	9.5	10.4	5.6	4.8	59.0	46.6

Notes: 1) The annual average growth rate of labour productivity.
2) The annual average growth rate of TFP.
3) The ratio of annual average TFP growth rate to annual average labour productivity growth rate.
4) SMEs with 30 to 299 employees.
5) LEs with 300 or more employees.
Source: Hondai (1992: 191-2).

Table 3.16 Determinants of the Ratio of TFP Growth to Labour Productivity Growth in Japanese Manufacturing SMEs, 1965-1982

	Ratio of TFP Growth to Labour Productivity Growth: SMEs [1]			
	(1)	(2)	(3)	(4)
Constant	-15.659	-3.568	-37.654	-37.087
Capital Stock[2]	1.4335		0.1592	
	(1.4431)		(1.6611)	
Share of TFP	0.2336	0.2583	0.2944	0.2920
Contribution: LEs[3]	(0.1712)	(0.1693)	(0.1890)	(0.1794)
Contract-out[4]			0.7411 *	0.7510 *
			(0.3510)	(0.3218)
Subcontracting[5]	0.5033 **	0.4923 **		
	(0.1804)	(0.1800)		
Adjusted R^2	0.732	0.733	0.744	0.702

Notes: 1) The dependent variable for regression models of (1) to (4) is the ratio of annual average TFP growth rate to annual average labour productivity growth rate for SMEs with 30-299 workers during 1965-1982. Figures in parentheses are standard errors. ** indicates significance at the 1 % level. * indicates significance at the 5 % level.
2) The average annual capital stock growth rate for SMEs during 1965-82.
3) The ratio of annual average TFP growth rate to annual average labour productivity growth rate for LEs with 300 or more workers during 1965-82.
4) The share of LEs that contract out goods/services to supplier firms in 1976.
5) The share of SMEs engaged in subcontracting with parent firms in 1976.
Source: Hondai (1992: 195).

Based on the estimated productivities, Hondai (1992: 193-6) elaborated the impact of subcontracting linkages on the performance of SMEs. For this purpose, he regressed the ratio of TFP growth to labour productivity growth of the 15 sectors on: 1) the growth of capital stock of SMEs during 1965-82; 2) the ratio of TFP growth to labour productivity growth in LEs during 1965-82; 3) the share of LEs that contract out input materials/goods to supplier firms through subcontracting arrangements in 1976; and 4) the share of SMEs that carry out subcontracting business with parent firms in 1976. Table 3.16 contains the results and shows that the explanatory variables representing the share of SMEs which engaged in subcontracting transactions and the share of LEs which purchased inputs from subcontractors are both statistically significant at the 1 percent and the 5 percent levels, respectively. The analysis therefore indicates that subcontracting arrangements between SMEs and LEs tend to raise productivity of SMEs in manufacturing. Similar to Urata (1995), Hondai (1992) concluded that the improvement in productivity of SMEs was the result of technical and other support extended by parent firms.

3.6 The Essence of Japan's Historical Experience with SME Development through Subcontracting

This chapter observed the development of manufacturing SMEs, the evolution of subcontracting systems, the relevance of subcontracting linkages as support mechanisms for SMEs, and the effects of subcontracting on productivity growth of SMEs in Japan during the 20th century. The chapter paid particular attention to the machinery industry. It is now possible to answer the two questions in the introduction to this chapter.

How and why did subcontracting systems emerge and develop in Japan's manufacturing industry? Figure 3.5 summarises that process. Before World War II, the rapid expansion of domestic and foreign demand for Japan's manufactures in the 1930s resulted in a shortage of output capacity in large-scale manufacturing enterprises, particularly in large machinery firms. To cope with this situation, large-scale machinery manufacturers started to contract out simple parts making and processing to SMEs, instead of following their earlier preference for in-house production. The initiation of subcontracting transactions reflected the following factors at that time: 1) the rapid expansion of markets; 2) unpredictable future economic situations; 3) scarce capital resources; 4) an increasing wage gap between LEs and SMEs; and 5) the development of infrastructure and technology. In addition, the effort by prefectural governments, local industrial associations and the central government to arrange business with Navy and Army arsenals and wartime economic controls contributed to some extent to the formation of subcontracting ties between LEs and SMEs.

Before the war, LEs provided SMEs with technical and other support through vertical inter-firm relationships mainly because: 1) LEs perceived subcontracting transactions with SMEs as necessary and economical; 2) SMEs did not have sufficient technological and other capabilities that could satisfy the needs of LEs; and 3) LEs expected that SMEs were able to acquire such capabilities and meet the requirements of LEs, if the former extended assistance to the latter. However, in the early stage of the development of subcontracting, the cooperative relationship between LEs and SMEs was embryonic.

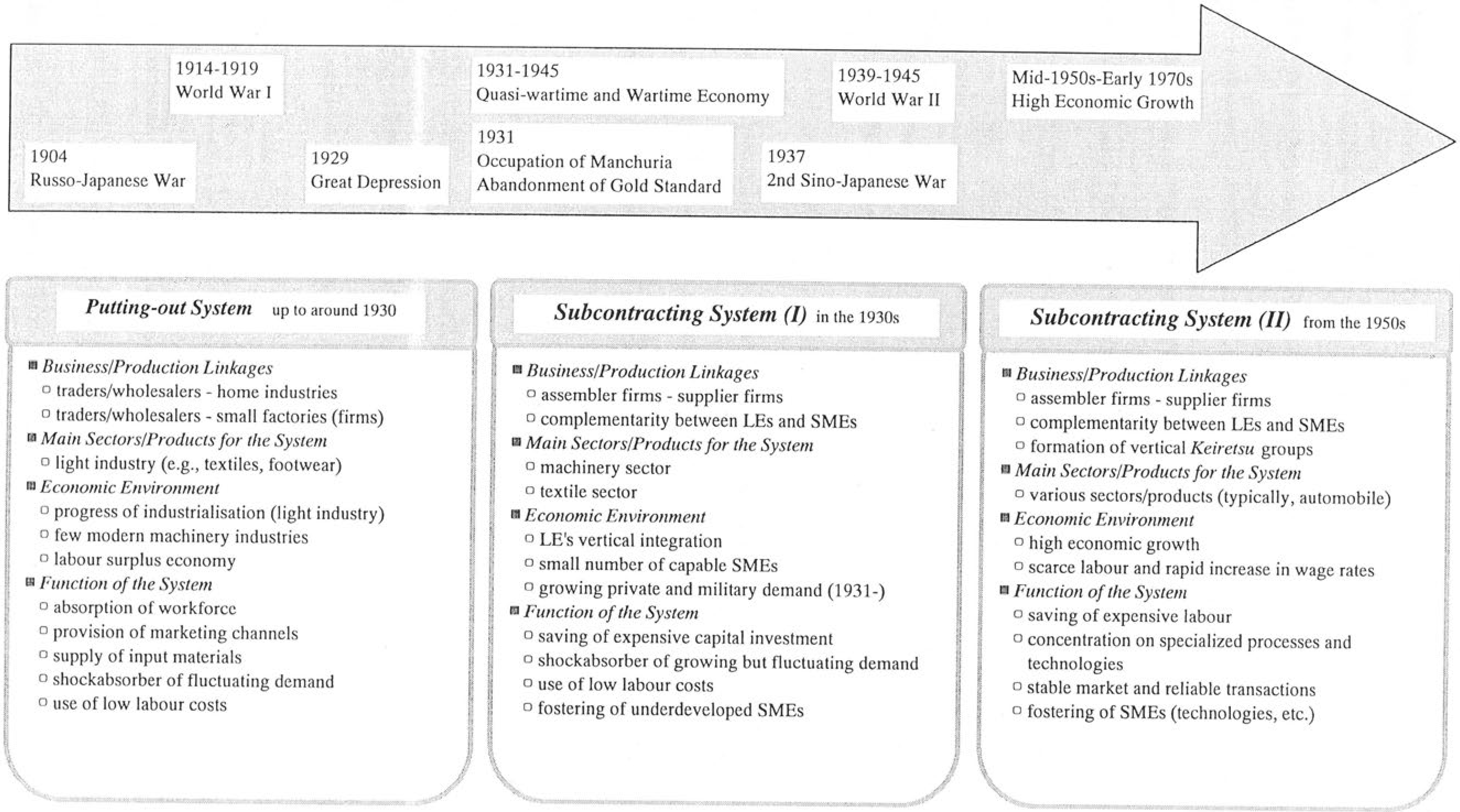
After World War II, subcontracting reappeared during the rapid economic expansion caused by the Korean War (1950-53). Large-scale machinery firms expected that subcontracting with SMEs would yield the same advantages as before the war: saving of scarce capital; low wages; and a buffer in times of economic fluctuations. However, continued high rates of economic growth after the mid-1950s changed the characteristics of subcontracting. Access to financial sources improved and the labour surplus decreased quickly. This inspired large machinery enterprises to purchase parts and components from small-medium producers with the aim of substituting for labour, instead of capital. Several other factors, such as the modernisation of the industrial structure, quick technological innovation and fierce competition in internal and external markets, also encouraged large principal firms to incorporate technically capable small-medium supplier firms into their production processes. At this stage, LEs expected that SMEs could not only offer low wage rates but would also have sufficient technology and equipment.

In the mid-1950s and the early 1960s, there were not many SMEs capable of supplying parts of high quality in required volumes at specified times. The rapid increase in demand for machinery at this time threatened to be constrained by the relatively low rate of progress in SMEs. Consequently, LEs began to strengthen SMEs that lacked the required capabilities, by providing them with technical, financial and other support. For the purpose of establishing beneficial and cooperative relationships, large-scale machinery firms, particularly automobile assembler firms, organised vertical *keiretsu* groups, in which large numbers of SMEs were integrated into multi-layer pyramidal structures. These large-scale manufacturers perceived that, without the modernisation and rationalisation of supplier firms, subcontracting systems did not function well and improvements only within assembler firms were unlikely to yield fruit.[28]

Japan's experience suggests that the key factors that made subcontracting systems work well were: 1) long-term and continuous relationships between large parent firms and small-medium subcontractors; 2) competition between supplier firms within a subcontracting system; 3) technical and other support given by parent firms to supplier firms; and 4) government support for creating environments that can promote the formation of functional subcontracting systems.

[28] For example, as observed before, the JIT (just-in-time) system does not improve production efficiency for assembler firms, if supplier firms are not able to produce a necessary quantity of parts and components and deliver them at a specific time.

Figure 3.5 Development of Subcontracting Systems in Japan



How and why did subcontracting linkages in Japanese manufacturing contribute to the development of SMEs? In the 1950s and 1960s, the dual structure caused by power imbalance between SMEs and LEs became an issue associated with subcontracting. However, SMEs redressed their subordinate relationships with LEs in the process of high growth from the early 1960s onwards. Several indicators by firm size during this period implied that Japan's SMEs were able to coexist with LEs, by producing a unit of output with less capital but more labour than LEs. The rising trend in the proportion of subcontracting SMEs in the manufacturing industry between the mid-1960s and the early 1980s suggested the increasingly important role of subcontracting in the Japanese economy and SME development. The role was important particularly for machinery SMEs, because the dependence on subcontracting was more significant in the machinery industry than in other industries.

In addition to stable markets, various forms of support that LEs extended to SMEs were important benefits of subcontracting to SMEs. The main types of assistance provided by large-scale manufacturing firms were technology-related support, such as transfer of production technology and production management, lending of production equipment, and the development of new products. Through subcontracting ties, parent firms were the largest source of new technology for manufacturing SMEs.

Studies that estimated TFP growth show that subcontracting contributed significantly to the improvement of productivity of manufacturing SMEs. This was attributed to the fact that subcontracting benefited SMEs in the forms of technological and other support and specialisation of work.

These answers to the two questions are the essence of Japan's historical experience with SME development through subcontracting and constitute the lessons from Japan for developing economies. Cultural specificity influences the establishment and development of subcontracting systems. Japanese culture has some special features that favour vertical inter-firm production arrangements. However, subcontracting has emerged and developed outside Japan, depending on whether the production system proved beneficial to the respective countries. Therefore, the following chapters in this study will analyse SME development and subcontracting in Indonesia with reference to Japan's historical experience, while considering the different settings in the two countries.

Chapter 4

Development of SMEs and Subcontracting in the Indonesian Manufacturing Industry

4.1 Introduction

The Indonesian economy experienced significant economic growth during 1966-97. The manufacturing industry has played an increasing role in this process (Hill 1996). It is often said that the LE sector, supported by government policies and measures, has been an important player in rapidly expanding the Indonesian manufacturing sector (e.g., Berry and Levy 1999: 33). As the previous chapter has shown, Japan's experience indicates that manufacturing SMEs, which developed concurrently with LEs, played an essential role in the process of industrialisation and economic development in that country during the 1930s and the high growth period from the mid-1950s to the early 1970s. This chapter seeks to examine whether SME development also took place in Indonesia concurrently with LE development and to what degree the SME sector contributed to industrial and economic development.

Section 4.2 provides an overview of economic growth in general and of the manufacturing industry in particular since the mid-1960s. Specific attention will be given to the machinery industry, which is the main sector discussed in the subsequent chapters of this study. Thereafter, Section 4.3 examines the development of manufacturing SMEs in Indonesia. For the purpose of exploring SME development, in Section 4.4, economic performance and productivity growth of SMEs are compared with LEs, based on the nation-wide manufacturing statistical data. Section 4.5 observes subcontracting linkages in Indonesia as possible support arrangements for SME development, on the basis of existing literature.

4.2 Economic Development in Indonesia

This section observes economic growth in Indonesia and the associated structural changes during the New Order period.[1] It then traces the development of the manufacturing industry. Particular attention is paid to the machinery sector, on which subsequent chapters will focus.

4.2.1 Economic Growth and Structural Changes in Indonesia

During the nineteenth century, Dutch colonial control expanded from Java to the rest of Indonesia. From around 1900, all of the country was brought under Dutch colonial administration, which gradually intensified in the following four decades. In 1942, the Japanese military occupied Indonesia and Dutch colonial rule ended. After the declaration of independence in 1945, Indonesia had to rally opposition against a return to Dutch colonial rule. It was not until 1949 that Indonesia obtained full independence with modest economic recuperation. The economic revival, however, paused in the late

[1] The term New Order refers to the period since the commencement of former President Soeharto's rule (including the period before he became President) in 1966 (Hill 1996: xv).

1950s and turned into decline in the early 1960s due to political turmoil and misguided economic policies under the first President, Sukarno. Before the mid-1960s, agriculture dominated the Indonesian economy as the leading sector and manufacturing had only a minimal role in economic activities (van der Eng 2002: 143-5).[2]

After recovering from the unstable political and economic situation in the first half of the 1960s, Indonesia maintained remarkable growth for around 30 years until 1997, when it was affected by the East Asian economic crisis. In these three decades, the Indonesian economy grew rapidly and its structure changed significantly. Figure 4.1 shows that per capita GDP with and without oil/gas increased fourfold during 1966-97.[3]

The pace and sources of economic growth have not necessarily been even or similar throughout this process. Hill (1996: 14-7) divided the years since 1966 into several identifiable sub-periods, taking account of the main economic trends and policy changes. He identified four sub-periods: 1) rehabilitation and recovery (1966-70); 2) rapid growth (1971-81); 3) adjustment to lower oil prices (1982-86); and 4) liberalisation and recovery (1987-92). With some modifications, Table 4.1 shows growth and sectoral composition of GDP for those sub-periods and for the period as a whole.[4]

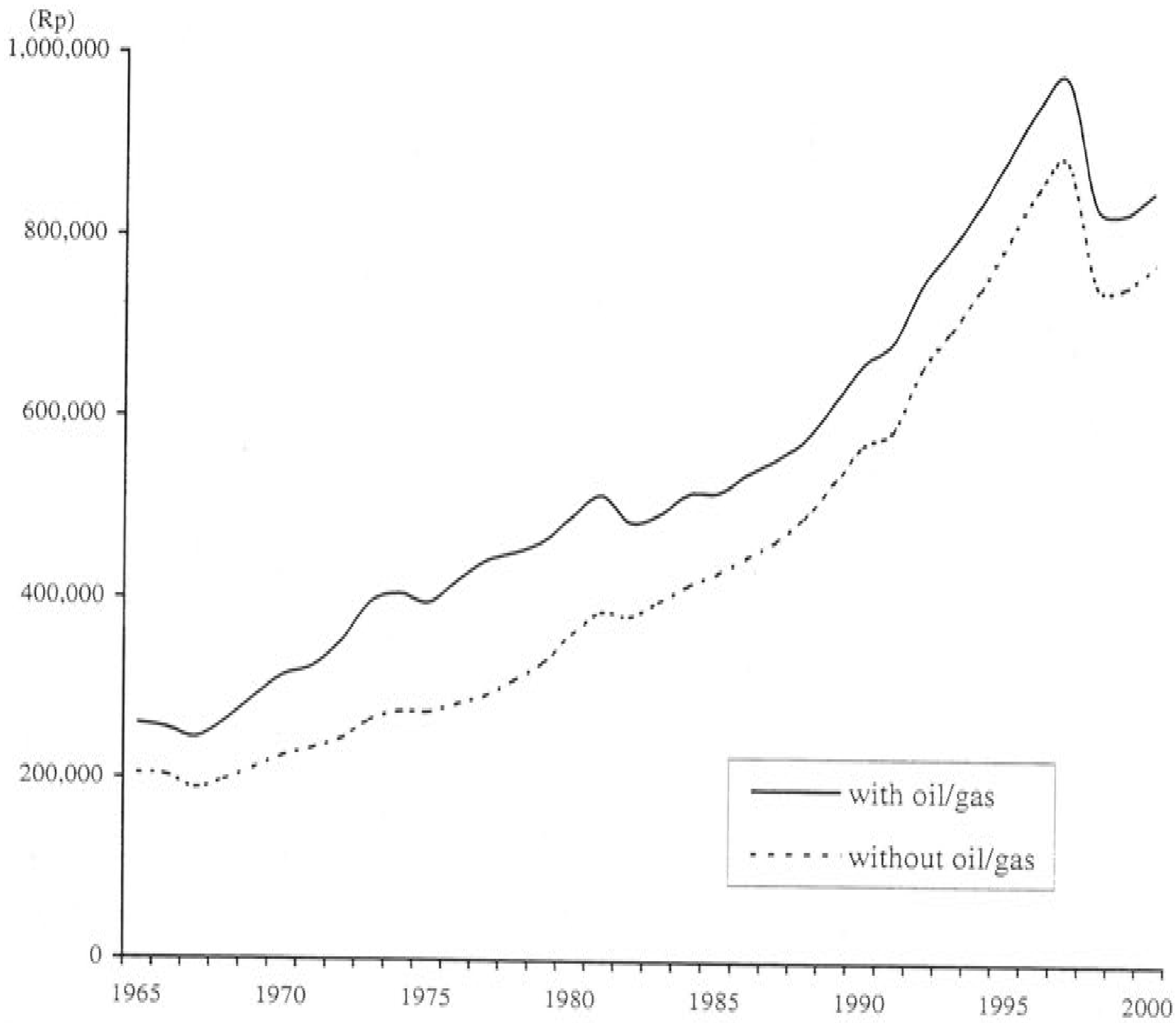
During the period of rehabilitation and recovery, the Indonesian government controlled hyper-inflation, re-established relations with the international aid community, and regained the confidence of international investors, by carrying out a stabilisation program advised by the IMF (Booth 1998: 178-83, Hill 1996: 15). The quick recovery

[2] During 1900-65 (except for 1942-48), agriculture occupied more than 40 percent of total GDP on average, while manufacturing accounted for only 10 percent (van der Eng 2002: 171-2).
[3] Per capita income with oil/gas grew at 4.4 percent annually, while that without oil/gas at 4.9 percent in the period of 1966-97.
[4] The period during 1993-96 is incorporated in 4) liberalisation and recovery (1987-92). In addition, a new sub-period is created as 5) economic turmoil during and after the 1997-98 crisis (1997-2000).

of basic economic conditions and a rapid expansion of oil production for exports led to a growth of real GDP (including oil/gas) by 7.4 percent per year during 1966-70.

Indonesia maintained high economic growth during the 1970s, largely because of the rapid expansion of oil production and a sharp hike in oil prices after 1973. Real GDP expanded by an average of more than 7 percent per year during 1970-81. During this decade, high oil revenues facilitated the government's stance towards nationalist economic policies, which were inward-looking, restrictive and pro-*pribumi* in trade, foreign investment and business fields.

Figure 4.1 GDP per capita in Indonesia, 1965-2000 (1983 Rupiah)



Source: Van der Eng (2002: 172-3), updated for 1999 and 2000 with data from BPS's *National Income of Indonesia*.

Table 4.1 Growth and Sectoral Share of GDP in Indonesia, 1966-2000

(Unit: %)

	Agriculture	*Industry* [1]		*Services*	*Total*	
		Manufacturing only	*Total*		*without oil/gas*	*with oil/gas*
Growth [2]						
1966 - 1970	3.2	8.9	10.8	3.6	4.7	7.4
1970 - 1981	4.2	10.2	10.3	8.9	7.5	7.1
1981 - 1986	3.3	8.9	6.6	5.5	5.2	3.0
1986 - 1996	3.6	11.3	11.9	7.9	8.3	7.4
1996 - 2000	1.0	0.7	-0.8	-2.5	-1.2	-1.3
1966 - 1996	3.7	10.2	10.3	7.3	7.0	6.5
1966 - 2000	3.4	9.0	8.9	6.1	6.0	5.6
Sectoral Share [3]						
1966 - 1970	42.4	11.9	17.6	40.0	100.0	
1971 - 1981	33.8	14.7	24.1	42.1	100.0	
1982 - 1986	27.6	17.8	26.7	45.7	100.0	
1987 - 1996	21.3	23.1	33.3	45.4	100.0	
1997 - 2000	18.2	27.0	38.9	42.9	100.0	
Sectoral Contribution to Growth [4]						
1966 - 1970	28.9	22.5	40.4	30.7	100.0	
1970 - 1981	19.0	19.6	32.1	48.9	100.0	
1981 - 1986	17.7	30.2	33.9	48.4	100.0	
1986 - 1996	9.5	31.1	47.2	43.3	100.0	
1996 - 2000	-14.8	-15.5	25.7	89.1	100.0	

Notes: 1) Industry includes manufacturing, mining, utilities and construction.
2) The growth of GDP represents average annual growth rates based on 1983 constant prices in each period.
3) The sectoral share is calculated as an average for respective years in each period.
4) The contribution of each sector group to GDP growth is weighted by respective sectoral GDP shares.

Source: Calculated using van der Eng (2002: 172-3), updated for 1999 and 2000 with data from BPS's *National Income of Indonesia*.

When oil and gas prices started to fall after 1982, the Indonesian economy slowed down. Export earnings decreased and foreign debt repayments became more difficult. Although the economy shrank in 1982, real GDP continued to increase at an annual average rate of 3 percent during 1981-86. The economic slowdown induced the government to prepare a series of economic reforms. It quickly introduced macroeconomic adjustment programs such as devaluation of the rupiah in 1983, reduction of government expenditure, cancellation of large-scale national projects and financial sector reforms.[5] A further fall in energy prices in 1986 required the government to implement further microeconomic reforms, which enhanced export-oriented manufacturing and foreign direct investment (FDI).

Such changes in economic policies contributed to an acceleration of economic growth until the onset of the 1997-98 economic crisis. During the decade from 1986, Indonesia's annual average growth of GDP (without oil/gas) exceeded 8 percent, driven by a rapid expansion of the manufacturing sector, which contributed to more than 30 percent of total growth. This high economic growth along with deregulation measures stimulated business activities in the private sector.[6]

Indonesia suffered an economic setback after 1997. The collapse of the rupiah together with other factors such as a sharp increase in energy and food costs and a rapid expansion of money supply drove inflation up roughly 58 percent in 1998, which exacerbated macroeconomic instability. Year-on-year GDP (with oil/gas) growth slowed to 4.3 percent in 1997 and the economy contracted by 13.1 percent in 1998. Output declined in 1998 across almost all sectors, with construction (-36.5%) and

[5] Pangestu (1996) well documented Indonesia's economic reforms, deregulation and privatisation between the early 1980s and the mid-1990s.

[6] Based on his analysis of total factor productivity (TFP), Timmer (1999) concluded that a range of deregulation programs introduced by the Indonesian government since the mid-1980s have been beneficial to all industries, although performance varied significantly across industries. In broad terms, these policy changes also improved the business environment for SMEs. The policy reforms tended to reduce discrimination against SMEs that had traditionally existed in trade policies, financial regulations and regulatory framework. For further details, see Hill (2001: 253-5).

banking/finance (-34.0%) most seriously affected. GDP of manufacturing shrank by 11.4 percent in 1998. Despite recovery in 1999 and 2000, GDP decreased at annual average rates of 1 percent during 1996-2000.

From a sectoral viewpoint, industry (including manufacturing, mining, utilities and construction) has been the main engine of economic growth in Indonesia since the mid-1960s. Table 4.1 illustrates that both manufacturing and industry as a whole expanded at more than 6 percent annually in each sub-period between 1966 and 1996. Growth in these sectors was significantly higher in the 1966-96 period than that in the economy as a whole. During 1986-96, the industrial sector contributed nearly half of total growth, surpassing agricultural and service sectors.

As a consequence of economic growth, substantial structural changes took place in the Indonesian economy. Agriculture's share declined steadily to 18 percent in 1997-2000. By contrast, industry's share increased from less than 20 percent during 1966-70 to nearly 40 percent during 1997-2000. The share of manufacturing increased from 12 percent to 27 percent in the same period and exceeded that of agriculture in 1991.

Changes in employment patterns also demonstrate structural transformation in the Indonesian economy. Table 4.2 indicates that the agricultural sector remained dominant, albeit that its share decreased from more than 70 percent in 1961 to less than 45 percent in 1999. By contrast, the share of industry in total employment significantly increased from 8 percent in 1961 to 18 percent in 1999, and that of the services sector doubled from 20 percent to nearly 40 percent. These different patterns of employment reflect differences between higher output growth of industry and services and lower output growth of agriculture. However, as Hill (1996: 21) explained, sectoral employment shares change more slowly than those of output. The discrepancies between the low output share and dominant employment share of agriculture and between the significant output share and low employment share of industry are remarkable. These may be explained by the fact that the agricultural sector is generally more labour intensive and/or more labour absorptive than the industrial sector.[7]

Table 4.2 Growth and Sectoral Share of Employment in Indonesia, 1961-1999

	Agriculture	*Industry* [1]		*Services*	*Total*	
		Manufacturing only	*Total*			
Growth (%)[2]						
1961 - 1971	0.6	4.8	4.1	5.1	2.0	
1971 - 1980	1.3	4.4	5.8	4.9	2.9	
1980 - 1990	4.2	5.8	5.0	3.2	4.0	
1990 - 1996	-2.3	7.0	8.3	7.1	2.5	
1996 - 1999	0.6	2.2	0.7	2.1	1.2	
Sectoral Share (%) and *Total Number of Employment* (thousand)						
1961	71.9	5.7	7.9	20.2	100.0	32,709
1971	62.8	7.4	9.7	27.5	100.0	39,692
1976	61.6	8.4	10.4	28.0	100.0	47,306
1980	54.8	8.5	12.5	32.7	100.0	51,192
1985	54.7	9.3	13.4	31.9	100.0	62,457
1990	55.9	10.1	13.7	30.4	100.0	75,851
1995	44.0	12.6	18.1	37.9	100.0	85,702
1999	43.2	13.0	17.8	39.0	100.0	88,817

Notes: 1) Industry includes manufacturing, mining, utilities and construction.
2) The growth of employment is represented as average annual growth rates in each period.

Sources: Calculated from BPS, *Population Census* (1961, 1971, 1980 and 1990), *Intercensal Population Survey* (1976 and 1985), and *National Labor Force Survey* (1996 and 1999).

[7] This may also be a matter of definition of employment. Underemployment is concentrated significantly in the agricultural sector. People with their main occupation in agriculture are likely to have sidelines in the informal sector.

Table 4.3 Exports, Imports and Foreign Direct Investment in Indonesia, 1966-1999

(Unit: %)

	Export		*Import*	
	Growth [1)]	*Exports/GDP* [2)]	*Growth* [1)]	*FDI/GCF* [3)]
1966 - 1970	10.4	11.4	16.8	-
1970 - 1975	11.6	20.1	24.2	4.5
1975 - 1980	6.9	26.8	10.9	2.8
1980 - 1985	-5.7	27.3	5.2	0.9
1985 - 1990	8.2	23.3	3.2	1.9
1990 - 1996	10.5	26.3	12.9	5.0
1996 - 1999	-6.4	34.9	-13.6	1.6

Notes: 1) Average annual growth rates in each period are calculated using the data for exports and imports of goods and services (with oil/gas) at 1995 constant US$ prices.
2) The ratio of exports to GDP is calculated as an average for respective years in each period. The calculation of this ratio uses exports of goods and services and GDP, both of which include oil/gas and are indicated in current rupiah prices.
3) The ratio of FDI (net inflows of foreign direct investment) to GCF (gross capital formation) is calculated as an average for respective years in each period. The ratio during 1966-70 is not available.

Source: Calculated from World Bank, *World Development Indicators 2001*.

As Table 4.3 has shown, exports have played an important role in Indonesian economic development since the mid-1960s. Due to the rehabilitation of production sector in the late 1960s and a sharp rise in oil prices in the first half of the 1970s, export values increased rapidly at annual average rates of around 10 percent. However, the pace of export growth slowed down to 7 percent a year in the second half of the 1970s and became negative in the first half of the 1980s, reflecting the oil glut. Thereafter, a series of economic reforms accelerated exports of non-oil/gas commodities (mainly manufactured goods), until the onset of the recent crisis. Exports grew remarkably at average annual rates of 8.2 percent during 1985-90 and 10.5 percent during 1990-96.

Table 4.4 Sectoral Share of Export and Import Commodities in Indonesia, 1966-1999[1)]

(Unit: %)

	Agriculture [2)]	*Mining* [3)]	*Manufacturing*	*Other*	*Total*
Exports					
1966 - 1970	52.8	44.6	2.1	0.5	100.0
1971 - 1975	36.7	61.7	1.4	0.2	100.0
1976 - 1980	25.5	72.4	2.0	0.1	100.0
1981 - 1985	13.3	79.0	7.2	0.5	100.0
1986 - 1990	20.9	50.8	28.3	0.0	100.0
1991 - 1996	16.5	34.3	49.2	0.0	100.0
1997 - 1999	15.8	26.9	47.3	10.0	100.0
Imports					
1966 - 1970	16.8	3.2	79.8	0.2	100.0
1971 - 1975	13.6	5.6	80.7	0.1	100.0
1976 - 1980	18.6	13.5	67.7	0.2	100.0
1981 - 1985	11.2	21.1	67.2	0.5	100.0
1986 - 1990	11.8	12.8	75.0	0.4	100.0
1991 - 1996	13.1	12.0	74.6	0.3	100.0
1997 - 1999	15.4	13.2	71.1	0.3	100.0

Notes: 1) The sectoral share of commodities in merchandise exports and imports (at current US$ prices) is calculated as an average of respective years in each period.
2) Agriculture includes food and agricultural raw materials.
3) Mining includes fuels (oil/gas), ores and metals.

Source: Calculated from World Bank, *World Development Indicators 2001*.

Table 4.4 shows the composition of commodity exports and imports since 1966. Until the mid-1980s, primary commodities (agricultural products, oil/gas and other minerals) occupied more than 90 percent of the total merchandise exports. Since the mid-1980s, manufacturing exports increased quickly and their share grew from 7 percent in the first half of the 1980s to nearly 50 percent in the 1990s.

By contrast, the composition of imports did not change markedly. Primary commodities (agriculture and mining) accounted for 20-30 percent of the total merchandise imports, while manufactured goods occupied the remaining 70-80 percent. The Indonesian economy continued a significant dependence on manufactured imports during the past 30 years despite the progress of industrialisation.

Table 4.3 indicates that the ratio of exports to GDP did not vary much during 1970-96.[8] It fluctuated around 25 percent, which was lower than in some other East Asian developing countries.[9] As Hill (1996: 14) points out, economic development in Indonesia has not necessarily been export-led, compared with neighbouring countries. In general, larger economies tend to be less export-reliant than smaller economies. Therefore, lower export dependence of the large Indonesian economy relative to that of some smaller neighbouring economies seems understandable.

Table 4.3 also shows the contribution of foreign direct investment (FDI, net inflows) to fixed capital investment in Indonesia. In the 1970s, the mining sector attracted most FDI, while in the late 1980s and the early 1990s, the more labour-intensive manufacturing sector was the main recipient of FDI as a consequence of deregulation measures. Similar to the above export ratio, the ratio of FDI to gross capital formation in Indonesia was not high, compared to that in some neighbouring countries.[10] However, FDI accelerated manufacturing development in Indonesia (Hill 1988). FDI was a source of resources that were scarce in industries, such as new

[8] A rise in the ratio during 1996-99 reflected the situation in which most economic activities in Indonesia stagnated due to the shrinkage of domestic demand through the adverse effect of the recent crisis, while the export sector boomed because of a substantially lower exchange rate.

[9] For example, the exports/GDP ratios in Thailand, Singapore, Malaysia and Hong Kong were roughly 38 percent, 183 percent, 83 percent and 141 percent, respectively, during 1990-96 (World Bank, *World Development Indicators 2001*).

[10] This may reflect the size of the economy and the policy stance to foreign investment. The FDI/gross capital formation ratios in Singapore, Malaysia, Thailand and the Philippines were around 28 percent, 17 percent, 4 percent and 7 percent, respectively, during 1990-96 (World Bank, *World Development Indicators 2001*). The former two countries with relatively higher ratios are smaller economies and have adopted more FDI-intensive strategy than the latter two countries with relatively lower ratios.

technology, modern production facilities, skilled and experienced personnel, employment opportunities, and domestic and foreign markets.[11]

Indonesia experienced rapid economic growth and structural transformation during the three decades before the onset of the 1997-98 crisis. The role of agriculture in terms of output and employment decreased, while that of industry increased. In terms of exports, the share of primary products decreased from nearly 100 percent in the 1960s and 1970s to roughly 50 percent in the 1990s, while that of manufactured exports rose to 50 percent. These observations suggest that the manufacturing industry was crucial to the transformation of the economy.

4.2.2 A Brief History of the Manufacturing Industry in Indonesia until the 1960s

During the Dutch colonial period, the role of the manufacturing sector in the Indonesian economy had been limited (Higgins 1959: 688; Hill 1988: 1; Paauw 1963: 180; Segers 1988: 16-38). Until the early 1930s, Indonesia did not experience significant growth in the manufacturing industry. Most of the modern manufacturing enterprises were owned by Western investors and engaged in processing agricultural commodities (e.g., sugarcane) and minerals (tin ore and crude oil) for export markets. Apart from those foreign companies, small-scale indigenous manufacturing firms largely concentrated on the production of goods for domestic needs. Ethnic Chinese were involved in several manufacturing enterprises including the production of sugar, cassava flour, kapok, and arrack distilleries.

In the early 1930s, the colonial government introduced trade protection, mainly in the form of tariffs and quotas, based on a Company Regulations Ordinance of 1934.

[11] Dhanani and Hasnain (2002) examined the impact of FDI on the manufacturing industry in Indonesia.

This policy attracted several large-scale multinational enterprises (e.g., General Motors, Goodyear Tyre, British-American Tobacco and Unilever) and promoted industrial development in Indonesia between the mid-1930s and the beginning of World War II (Thee 1989: 142-4).

However, such an impetus to manufacturing growth was interrupted by the Japanese occupation during 1942-45 and the subsequent struggle for independence during 1945-50. When Indonesia obtained its full sovereignty in 1949, the economy needed postwar reconstruction and repair.[12] At the time, the industrial structure was still the same as in the colonial era. According to Paauw (1963: 180), small-scale handicraft producers were dominated by *pribumi* entrepreneurs, while export-oriented enterprises were occupied by foreign owners. Modern factories producing consumer goods such as garments for local consumption were managed by Europeans and ethnic Chinese. The Chinese group also engaged in less capital-intensive consumer goods production such as rice mills and ice factories.

The government of newly independent Indonesia introduced in 1951 the Economic Urgency Plan as an import substitution strategy to foster *pribumi* manufacturing industries and control foreign investment (Hill 1988: 4). In 1956, the government launched the first five-year development plan, which aimed to rehabilitate existing factories, maximise the use of domestic raw materials and upgrade managerial capability and labour skills (Soehoed 1967: 68). The nationalistic stance of a newly independent country induced the government to adopt inward-looking industrial policies and less frequently utilise foreign knowledge on industrial development. The activities of foreign enterprises were restricted through, for example, limits on imports

[12] During World War II and the war of independence, the damage suffered by the industrial sector was around 60 percent of the total capital invested in industry (Neuman 1955: 27).

of essential commodities (e.g., textiles, cement, iron bars and wire, tin plate and paper), and Dutch companies were nationalised in 1957-58.

In the first half of the 1960s, shortages of electricity, spare parts and imported raw materials occurred, mainly because of the shortages of the government budget and foreign exchange earnings. As a result, textile manufacturers were not able to fully utilise their production capacity. In the second half of 1962, 95 percent of non-mechanised looms were not in operation (Palmer and Castles 1971: 315, 322-5). Also, the utilisation ratio of capacity in heavy and chemical industries, most of which were run by state-owned enterprises, was on average less than 30 percent in 1966, due to inefficient planning and management in addition to the lack of imported materials (Soehoed 1967: 78-80).

Overall, until the 1960s, Indonesia had not experienced significant progress in industrialisation. Moreover, by the mid-1960s, the underdeveloped manufacturing sector experienced a further setback caused by the mismanagement of economic policies and accelerating political turmoil. The Indonesian manufacturing sector as a whole accounted for roughly 10 percent of GDP in 1965 and GDP in industry shrank at the rate of -1.2 percent annually during 1940-65 (Van der Eng 2002: 171-3). Large-scale enterprises existed mainly in export-oriented resource-based industry, but they were dominated by foreign investors, not local entrepreneurs.[13] There were few linkages between production activities of those LEs and local SMEs, due to the characteristics of colonial economic management and less linkage-generated subsectors in which foreign-affiliated LEs engaged. Throughout the colonial period and the first 20 years from the end of World War II, small domestic demand for products from the machinery sector seems to have limited chances for the manufacturing industry to

[13] In the late 1950s and the early 1960s, almost all foreign enterprises were nationalised and changed to state-owned enterprises.

develop. At the beginning of the New Order era in 1966, Indonesia had to start with an effort to reconstruct its industrial sector.

Although a great number of small-scale producers had already emerged in the country's manufacturing industry by the 1960s, most of them were traditional handicraft producers and did not have sufficient capabilities to produce or supply modern and quality products either for intermediary use or final consumption. However, the existence of numerous SMEs without sufficient capabilities in Indonesia in the 1960s was not very different from Japan's situation in the early 1930s, as observed in Chapter 3. There were very few competent SMEs in Japan in the early 1930s, when its manufacturing industry, particularly the machinery industry, initiated and expanded subcontracting transactions between SMEs and LEs.

4.2.3 Development of the Indonesian Manufacturing Industry since the Early 1970s

Most of the data available for examining the development of the manufacturing industry are provided by *Large and Medium Manufacturing Statistics*, an annual survey on manufacturing establishments with 20 or more workers.[14] For sectoral analysis in manufacturing, two- or three-digit International Standard Industrial Classification (ISIC) is used.[15] Specific attention will be paid to the machinery industry (ISIC 38).

---

[14] In 1996, this annual survey covered roughly 90 percent of manufacturing value added and 40 percent of employment, respectively. The rest was generated by firms with 19 or less workers. Since BPS's backcast data were not available to the author, this study used its original data. This means that the earlier data, particularly before the mid-1980s, were undervalued due to lower response rates and, as a consequence, the average annual growth rates are likely to be overestimated between the earlier and later years. The difference between the BPS original data and its backcast data for employment and value added tends to narrow from around 30 percent in 1980 to 10 percent in 1990 (Ito and Orii 2000).

[15] This and subsequent sections deal mainly with the non-oil/gas manufacturing industry and exclude oil and gas subsectors (ISIC 353 and 354).

Table 4.5 Growth of and Sectoral Share in Real Value Added in Indonesia's Non-Oil/Gas Manufacturing Industry, 1971-1999[1)]

(Unit: %)

Sector[2)]	*1971-75*	*1975-80*	*1980-85*	*1985-90*	*1990-96*	*1996-99*	*1976-96*	*1976-99*
Growth[3)]								
Manufacturing	9.3	13.2	13.8	15.6	13.3	-1.8	14.1	11.9
Food (31)	6.2	8.2	9.0	13.2	6.4	7.2	9.9	9.6
Textiles and Apparel (32)	19.1	7.5	13.6	20.4	16.3	0.7	14.3	12.4
Wood and Paper (33+34)	19.5	21.4	19.5	22.2	9.3	1.7	18.2	15.9
Chemicals & Basic Metals (35+37)	-4.3	19.7	21.6	13.3	13.4	-8.2	16.3	12.7
Machinery (38)	39.3	21.4	10.1	17.1	22.2	-6.5	16.8	13.5
Metalworking (381)	22.1	12.0	19.8	8.3	20.3	-7.8	14.3	11.1
General Machinery (382)	54.4	11.7	8.5	18.4	16.4	-26.1	16.4	9.7
Electrical Machinery (383)	42.9	25.8	7.2	9.4	31.6	-1.4	17.7	15.0
Transport Equipment (384)	58.8	24.2	9.6	26.9	18.6	-8.2	17.2	13.5
Precision Equipment (385)	51.6	27.8	15.1	18.9	42.6	13.0	26.4	24.6
Other[4)] (39+36)	22.8	18.2	13.6	7.8	15.6	-7.5	12.6	9.7
Sectoral Share[5)]								
Food (31)	50.3	40.8	35.5	26.7	22.8	23.4		
Textiles and Apparel (32)	14.9	13.7	11.7	15.4	17.9	18.2		
Wood and Paper (33+34)	5.3	6.9	9.7	15.6	14.2	14.2		
Chemicals & Basic Metals (35+37)	16.5	17.4	21.2	23.6	21.0	19.0		
Machinery (38)	8.9	14.3	15.9	14.3	19.3	20.7		
Metalworking (381)	3.0	3.4	3.5	4.3	3.7	3.2		
General Machinery (382)	1.1	1.1	1.2	1.0	1.4	1.4		
Electrical Machinery (383)	2.3	4.3	4.2	2.7	4.7	7.0		
Transport Equipment (384)	2.5	5.4	6.9	6.2	9.3	8.7		
Precision Equipment (385)	0.0	0.1	0.1	0.1	0.2	0.4		
Other[4)] (39+36)	4.1	6.9	6.0	4.4	4.8	4.5		
Total	100.0	100.0	100.0	100.0	100.0	100.0		

Table 4.5 Growth of and Sectoral Share in Real Value Added in Indonesia's Non-Oil/Gas Manufacturing Industry, 1971-1999 (continued)[1]

(Unit: %)

Sector[2]	*1971-75*	*1975-80*	*1980-85*	*1985-90*	*1990-96*	*1996-99*	*1976-96*	*1976-99*
Sectoral Contribution to Growth[6]								
Food (31)	29.1	24.6	23.4	22.0	10.8	-141.9		
Textiles and Apparel (32)	26.5	7.6	11.6	19.6	21.5	-10.7		
Wood and Paper (33+34)	9.7	10.9	13.8	21.6	9.8	-20.3		
Chemicals & Basic Metals (35+37)	-6.6	25.2	33.5	19.5	20.8	131.2		
Machinery (38)	32.6	22.5	11.7	15.2	31.6	113.3		
Metalworking (381)	5.8	3.0	4.6	2.2	5.5	20.6		
General Machinery (382)	5.3	1.0	0.6	1.1	1.7	30.1		
Electrical Machinery (383)	8.7	8.4	2.0	1.6	11.0	8.1		
Transport Equipment (384)	12.9	9.9	4.4	10.2	12.8	58.8		
Precision Equipment (385)	0.0	0.2	0.1	0.1	0.6	-4.3		
Other[4] (39+36)	8.7	9.2	6.0	2.1	5.5	28.4		
Total	100.0	100.0	100.0	100.0	100.0	100.0		

Notes: 1) This table uses the data for manufacturing firms with 20 or more employees, except for those between 1971 and 1973, where firms with 5 or more workers with use of power equipment or firms with 10 or more workers without use of power equipment are included. Oil and gas subsectors (ISIC 353 and 354) are excluded.

2) The numbers in parentheses indicate ISIC (International Standard Industrial Classification) code.

3) The growth indicates average annual growth rates in each period. Value added data in this and following tables of this chapter are deflated by the implicit GDP deflator for manufacturing (1993=100) from BPS's *National Income of Indonesia*, due to a lack of adequate and long-term sectoral and subsectoral deflators.

4) Other includes miscellaneous (ISIC 39) and non-metal/mineral (ISIC 36) products.

5) The (sub)sectoral share of value added is calculated as an average for respective years in each period. The observed periods for this share are: 1971-75, 1976-80, 1981-85, 1986-90, 1991-96, and 1997-99.

6) The contribution of each (sub)sector group to manufacturing value added growth is weighted by respective (sub)sectoral value added.

Source: Calculated from BPS, *Large and Medium Manufacturing Statistics*.

Table 4.5 shows the growth pattern of real value added in the non-oil/gas manufacturing industry since 1971. Before the 1997-98 crisis, the manufacturing industry as a whole was expanding at an annual average growth rate of 14.1 percent during 1976-96.

Value added in the food processing industry (ISIC 31) grew at a stable rate in the last 30 years including the recent crisis period. This may reflect the situation where the food products are largely based on domestically produced inputs, rather than imported materials, and the fact that food products are not subject to swings in demand, as luxury products are.[16] The textile and apparel industry (ISIC 32), which has been one of the key manufacturing sectors in Indonesia, expanded rapidly. The labour-intensive production processes of its downstream side are suitable for labour-abundant and lower wage Indonesia. The chemicals and basic metals industries (ISIC 35+37), which have been protected by government regulations such as restrictions on foreign investment, showed high but unstable growth of output. Since these industries are capital-intensive and need to rely on imported inputs and technologies, they were more vulnerable to the changes in international and domestic economies such as the recent crisis.

Value added of the machinery industry (ISIC 38) expanded faster than manufacturing as a whole, except for some periods including the 1997-98 crisis. In the first half of the 1990s, the machinery industry contributed more to the growth of manufacturing value added than any other sector. All subsectors of the machinery industry, metalworking (ISIC 381), general machinery (ISIC 382), electrical machinery (ISIC 383), transport equipment (ISIC 384) and precision equipment (ISIC 385) grew rapidly during the 1970s and during 1985-96. Particularly since 1986, the economic boom, supported by a series of deregulation measures, accelerated the expansion of production in these machinery subsectors. For example, after its single-digit growth during 1980-85, the transport equipment subsector including automobile and

[16] In addition, the food processing industry expanded its production capacity.

motorcycle production recorded a high annual growth rate of more than 18 percent.[17] Subsequent to this high growth period, however, the machinery industry was seriously affected by the 1997-98 economic crisis, when value added of general machinery and transport equipment shrunk at annual rates of -26 and -8 percent, respectively. This resulted mainly from the reliance of the machinery industry on imported inputs and the limited size of domestic markets for luxury goods.

Table 4.5 also shows that the composition of manufacturing value added changed markedly since 1971, reflecting the different rates of growth among the sectors. The share of the food industry (ISIC 31) fell significantly to only one-fifth in the 1990s. The share of the other sectors increased, but to a different extent. For instance, the share of both textile and apparel (ISIC 32) and chemicals and basic metals (ISIC 35+37) reached 18-20 percent in the second half of the 1990s, increasing by 3-4 percentage points over the past 30 years.

The machinery industry (ISIC 38) accounted for 21 percent of manufacturing output in the second half of the 1990s, more than doubling its share in the past 30 years. It has become the second largest value added generator after the food processing industry. More specifically, electrical machinery (ISIC 383) and transport equipment (ISIC 384) substantially increased their output share, occupying respectively 7 and 8.7 percent in the late 1990s.

Table 4.6 indicates that employment in the Indonesian non-oil/gas manufacturing industry grew considerably by 6 to 12 percent per annum between 1971 and 1996, before slowing down to 0.2 percent during the recent crisis. Compared to the food processing industry (ISIC 31), employment growth in other industries tended to be significantly higher, except during the economic downturns of 1996-99.

[17] See Aswicahyono, Basri and Hill (2000) for the automobile industry and Thee (1997) for the motorcycle industry. Both of them discussed in detail the characteristics, structure and performance of these subsectors in Indonesia.

Table 4.6 Growth of and Sectoral Share in Employment in Indonesia's Non-Oil/Gas Manufacturing Industry, 1971-1999[1)]

Sector[2)]	*Growth and Sectoral Share of Employment (%)*[3)]					
	1971-75	*1975-80*	*1980-85*	*1985-90*	*1990-96*	*1996-99*
Growth						
Manufacturing (3)	8.7	6.4	11.7	9.7	8.0	0.2
Food (31)	3.9	2.5	10.0	3.4	4.7	0.3
Textiles and Apparel (32)	9.9	5.3	8.1	14.0	10.8	-0.3
Wood and Paper (33+34)	15.0	8.5	19.7	15.7	6.7	0.4
Chemicals/Basic Metals (35+37)	14.8	13.2	17.4	9.5	4.3	1.3
Machinery (38)	18.1	14.6	8.1	7.8	12.3	0.0
Metalworking (381)	7.0	12.8	7.7	6.4	12.5	-8.5
General Machinery (382)	15.1	6.2	6.8	13.1	6.8	0.8
Electrical Machinery (383)	17.8	29.2	3.1	6.6	18.6	11.7
Transport Equipment (384)	48.9	9.2	14.0	8.5	7.4	-8.6
Precision Equipment (385)	54.6	20.1	16.3	9.3	29.3	5.1
Other (39+36)[4)]	13.1	6.9	13.8	7.6	10.5	0.1
Sectoral Share						
Food (31)	42.8	36.3	30.3	27.6	20.3	19.5
Textiles and Apparel (32)	27.8	27.0	24.3	24.4	32.1	31.7
Wood and Paper (33+34)	8.0	9.2	13.7	16.9	17.5	17.7
Chemicals/Basic Metals (35+37)	8.0	10.9	13.9	15.4	12.9	12.7
Machinery (38)	8.4	11.4	12.2	10.2	11.2	12.1
Metalworking (381)	3.4	4.0	3.9	3.3	3.5	3.1
General Machinery (382)	1.2	1.2	1.1	1.0	1.1	1.1
Electrical Machinery (383)	1.7	3.0	3.3	2.3	3.3	4.8
Transport Equipment (384)	2.0	3.1	3.8	3.5	3.1	2.7
Precision Equipment (385)	0.1	0.1	0.1	0.1	0.2	0.4
Other (39+36)[4)]	5.0	5.2	5.6	5.5	6.0	6.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Notes: 1) This table uses the data for manufacturing firms with 20 or more employees, except for those between 1971 and 1973, where firms with 5 or more workers with use of power equipment or firms with 10 or more workers without use of power equipment are included. Oil and gas subsectors (ISIC 353 and 354) are excluded.
2) The numbers in parentheses indicate ISIC code.
3) The growth indicates average annual growth rates in each period, while the sectoral share is calculated as an average for respective years in each period. The observed periods for the sectoral share are: 1971-75, 1976-80, 1981-85, 1986-90, 1991-96, and 1997-99.
4) Other includes miscellaneous (ISIC 39) and non-metal/mineral (ISIC 36) products.

Source: Calculated from International Economic Data Bank (IEDB), *Stars* (database) based on UNIDO data (originally from BPS's employment data).

Due to its poorer growth performance, the share of the food processing industry, which occupied more than 40 percent of total manufacturing employment in the early 1970s, more than halved by the late 1990s. By contrast, all other sectors occupied a greater employment share in the late 1990s than in the early 1970s. The textile and apparel industry (ISIC 32), instead of the food processing industry, has become the main absorber of additional labour in manufacturing since the early 1990s. Notably, the share of the wood and paper industries (ISIC 33+34) increased from 8 percent to 18 percent. The labour-intensive wood processing industry clearly absorbed significant amounts of labour during this period. As a consequence of the rapid growth of the machinery industry (ISIC 38), it accounted for more than 12 percent of manufacturing employment in the latter half of the 1990s. Metalworking (ISIC 381), electrical machinery (ISIC 383) and transport equipment (ISIC 384) occupied 3-5 percent of the manufacturing workforce by the late 1990s.

The sectoral composition of non-oil/gas manufactured exports and imports over the past 30 years is shown in Table 4.7, which refers to the data converted from SITC (Standard International Trade Classification) to ISIC by the International Economic Data Bank (IEDB). The sectoral share of manufactured exports has changed remarkably since the early 1970s. Similar to our observation above in relation to value added and employment, the food processing industry (ISIC 31) reduced its share of exports from more than 56 percent during the early 1970s to less than 10 percent in the late 1980s. The export share of textile and apparel (ISIC 32), wood and paper (ISIC 33+34) and machinery (ISIC 38) rose considerably from single-digit levels in the early 1970s.

Table 4.7 Sectoral Share of Indonesia's Non-Oil/Gas Manufactured Exports and Imports, 1971-1999[1]

Sector[2]	Sectoral Share of Exports and Imports (%)[3]					
	1971-75	*1976-80*	*1981-85*	*1986-90*	*1991-96*	*1997-99*
Exports						
Food (31)	55.9	37.2	15.5	9.8	8.2	9.9
Textiles and Apparel (32)	1.4	4.3	12.5	22.4	27.2	20.8
Wood and Paper (33+34)	4.9	13.7	31.0	39.0	26.4	21.8
Chemicals/Basic Metals (35+37)	28.6	30.3	31.1	21.5	20.6	21.5
Machinery (38)	8.7	13.5	8.3	4.0	13.7	19.9
Metalworking (381)	4.8	2.2	1.4	1.5	2.6	3.1
General Machinery (382)	1.6	0.6	0.2	0.1	1.7	4.3
Electrical Machinery (383)	0.4	4.4	5.3	1.4	6.9	9.6
Transport Equipment (384)	0.8	1.8	1.3	0.7	1.8	2.0
Precision Equipment (385)	0.3	0.7	0.1	0.3	0.7	0.9
Other (39+36)[4]	0.5	1.0	1.6	3.3	3.9	6.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Imports						
Food (31)	8.2	15.2	6.8	4.5	5.1	7.9
Textiles and Apparel (32)	6.9	3.5	2.0	3.2	5.5	6.7
Wood and Paper (33+34)	3.0	3.3	3.3	3.9	3.9	4.8
Chemicals/Basic Metals (35+37)	30.2	28.8	32.3	35.5	30.7	30.3
Machinery (38)	48.4	46.9	53.4	50.9	52.8	48.0
Metalworking (381)	6.4	6.7	7.1	4.8	5.3	5.4
General Machinery (382)	17.1	14.3	19.9	21.5	21.7	19.0
Electrical Machinery (383)	7.8	10.2	8.7	8.3	10.6	11.8
Transport Equipment (384)	15.3	13.8	15.4	13.1	12.6	9.6
Precision Equipment (385)	1.8	1.9	2.3	2.6	2.2	2.0
Other (39+36)[4]	3.3	2.3	2.2	2.0	2.0	2.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Notes: 1) Oil and gas subsectors (ISIC 353 and 354) are excluded.
2) The numbers in parentheses indicate ISIC code. The data were converted from SITC (Standard International Trade Classification) to ISIC by the International Economic Data Bank (IEDB).
3) The sectoral share is calculated as an average for respective years in each period.
4) Other includes miscellaneous (ISIC 39) and non-metal/mineral (ISIC 36) products.
Source: Calculated from International Economic Data Bank (IEDB), *Stars* (database).

According to Hill's analysis (1996: 81-4), revealed comparative advantages (RCAs) for labour-intensive manufactures such as textile and apparel rose quickly after the mid-1980s.[18] This implies that a series of macroeconomic and microeconomic reforms since the early 1980s enabled Indonesian producers to obtain a comparative advantage in the labour-intensive manufactured products trade, reflecting its relative factor endowments as a consequence of the elimination of regulatory obstacles.

Different from the patterns of exports, the composition of manufactured imports by sector did not change significantly after 1971. According to Table 4.7, the largest import sectors were chemicals and basic metals (ISIC 35+37) and machinery (ISIC 38), which together accounted for 75-85 percent of total manufactured imports during the entire period. The former sector occupied roughly 30 percent, and the latter sector around 50 percent of imports. Among machinery imports, general machinery (ISIC 382), electrical machinery (ISIC 383) and transport equipment (ISIC 384) were outstanding. High import-dependency on machinery, chemicals and basic metals remained unchanged in Indonesian industrial structure.[19]

Table 4.8 presents the results of a UNIDO (2000: 116-7) study that examined export intensity and import dependence of the Indonesian manufacturing industry in the 1990s. During the years of high economic growth 1990-96, the export intensity of the non-oil/gas manufacturing increased, as measured by the percentage of exports to output. Gross export intensity for manufacturing as a whole increased from 12 percent in 1990 to 27 percent in 1996, before declining to 14 percent in the crisis year of 1998. Most of the sectors also experienced an upward trend between 1990 and 1996 and a

[18] A steep rise in RCAs for resource-based manufactures was also observed in the early 1980s, in addition to an increase in those for labour-intensive manufactures. This reflected a sharp growth in plywood exports mainly in response to the log export ban (Hill 1996: 83-4). RCAs measure relative export performance by country and industry, defined as a country's share of world exports of a good divided by its share of total world exports.

[19] See Hayashi (1996), which used I-O analysis to identify the reasons why the Indonesian economy has not been able to change the structure of heavy import-dependency on those items.

downward trend from 1996 to 1998. Wood and furniture (ISIC 33), textiles and apparel (ISIC 32) and other (ISIC 39) including toys and jewellery were sectors with a relatively high export-orientation. The machinery industry (ISIC 38) was not considerably export-oriented, but its gross export intensity rose from 4 percent in 1990 to 22 percent in 1996.

Table 4.8 Export Intensity and Imported Inputs Ratio of Indonesia's Non-Oil/Gas Manufacturing Industry, 1990-1998[1)]

Sector[2)]	*Export Intensity (%)*[3)]								*Imported Inputs Ratio (%)*[5)]			
	Gross Export Intensity				*Net Export Intensity*[4)]							
	1990	*1993*	*1996*	*1998*	*1990*	*1993*	*1996*	*1998*	*1990*	*1993*	*1996*	*1998*
Manufacturing	12	20	27	14	0	6	10	-3	31	28	32	33
Food (31)	6	10	16	13	2	6	11	8	11	7	10	8
Textiles/Apparel (32)	17	33	43	19	4	16	24	-3	31	33	35	40
Wood/Furniture (33)	34	56	69	30	33	55	68	27	3	3	3	5
Paper/Printing (34)	6	1	9	1	-7	-13	-5	-14	35	30	29	31
Chemicals (35)	13	15	25	16	-5	-2	7	-4	42	35	32	35
Non-metals/Minerals (36)	6	8	11	9	-	1	5	-1	28	28	21	36
Basic Metals (37)	10	12	10	3	-7	-14	-11	-24	50	58	59	42
Machinery (38)	4	13	22	10	-18	-16	-8	-24	53	57	57	64
Other (39)	11	57	41	21	-2	35	24	4	33	45	34	35

Notes: 1) This table uses the data for manufacturing firms with 20 or more employees. Oil and gas subsectors (ISIC 353 and 354) are excluded.
2) The numbers in parentheses indicate ISIC (International Standard Industrial Classification) code.
3) Export intensity is indicated as the percentage of exports to gross output.
4) Net exports = gross exports - imports of raw materials and intermediate inputs.
5) Imported inputs ratio is as the percentage of imported inputs to total inputs.
Source: UNIDO (2000), Tables 5.6 and 5.7.

After deducting imports of raw materials and intermediate inputs from gross exports, it appears that the levels of export intensity for wood and furniture (ISIC 33) and food (ISIC) are not significantly different in gross and net terms. These two sectors did not utilise imported input materials as extensively as other sectors. Particularly, the wood and furniture industry imported less than 5 percent of raw materials and intermediate goods as necessary inputs during 1990-98.

By contrast, machinery (ISIC 38) and basic metals (ISIC 37) both recorded -24 percent net export intensity in 1998, which means that these two sectors imported more than the value of their exports. They have an extremely high import-dependent structure.[20] This finding is consistent with Hayashi (1996: 14-5), which observed that the machinery sector in Indonesia is highly dependent on imported inputs. An increase in demand induces a large increase in imported intermediate goods through direct and indirect linkages. This implies a lack of sufficient supporting industries that supply raw materials and intermediate inputs to the machinery sector in Indonesia.

Table 4.9 shows the geographical distribution of manufacturing value added in Indonesia. Java has continued to dominate in the process of industrial development, accounting for around three quarters of non-oil/gas manufacturing value added during 1983-1998. Jakarta/West Java and East Java, which occupied more than 60 percent of total manufacturing value added, are clearly key centres of industrial activity in Indonesia, reflecting locational advantages such as large markets and well-developed physical and human infrastructure.

---

[20] In general, these sectors are trade-intensive in intra-industry. However, the Indonesian case indicates not a two-way trade (i.e. export and import) but a one-way trade on the basis of highly import-reliant structure with less export-oriented production.

Table 4.9 Geographical Distribution of Value Added in Indonesia's Non-Oil/Gas Manufacturing Industry, 1983, 1990 and 1998

(Unit: %)

Region/Province	*1983*	*1990*	*1998*
Java and Bali	76.2	75.8	73.5
Jakarta/West Java	42.5	42.6	41.8
East Java	22.3	20.8	20.0
Sumatra	16.8	14.7	17.1
Kalimantan	4.6	6.6	6.0
Sulawesi	1.7	1.7	2.2
Other Region	0.7	1.2	1.2
Total	100.0	100.0	100.0

Source: BPS, *Gross Regional Domestic Product of Provinces in Indonesia by Industrial Origin.*

4.3 SME Development in Indonesia

There are several definitions of SMEs and different definitions are used by various Indonesian government agencies. This section first defines SMEs suitable for the purpose of this study. In the next part, SME policies and measures in Indonesia are reviewed in order to understand the general conditions under which SMEs developed. Thereafter, the section provides an overview of the development of SMEs in the manufacturing industry, particularly the machinery sector.

4.3.1 Definition of SMEs in This Study

The Indonesian government often perceived the promotion of SMEs not as an aspect of industrial development but of social development. It tended to support micro and smaller SMEs. Berry and Levy (1999: 31) state that LEs and micro- or very small-scale enterprises have received a large part of the incentives which the Indonesian government provided.[21] These enterprises occupied a considerable share of output and workforce. In contrast, medium-scale viable firms have received limited attention and occupied a modest share in production and employment.[22] The experience of these medium-scale enterprises with 100 to 300 workers has hardly been highlighted in the context of Indonesia.

Consequently, most SME definitions in Indonesia cover only smaller SMEs and do not include larger SMEs. As indicated in Table 4.10, BPS (the former Central Bureau of Statistics, currently Statistics Indonesia) defines firms with four or less workers, those with 5 to 19 workers and those with 20 to 99 workers as household, small-scale, and medium-scale enterprises, respectively. The Indonesian Ministry of Industry and Trade (MOIT) defines manufacturing SMEs on the basis of the value of their assets (excluding land and buildings). Firms with assets of less than Rp 200 million are small-scale enterprises and those with assets of Rp 200 million to Rp 5 billion are small- and medium-scale enterprises. The Indonesian Small Business Law of 1995, which aimed to foster SMEs for the purpose of promoting a fair and equitable society, defines small-scale enterprises as firms with assets (excluding land and buildings) of less than Rp 200 million or with sales of less than Rp 1 billion.[23] This

[21] Despite frequent manifestations of great sympathy for SMEs, the public policies in Indonesia have tended to favour LEs (Hill 2001: 253). On the other hand, when the government extends assistance to SMEs, the main target group has been not medium-scale enterprises but cottage or small-scale enterprises particularly owned by *pribumi* entrepreneurs. Chapters 6 and 8 in this study will illustrate that the latter group had better access to technical and financial support provided by the public sector.

[22] As stated above, in Indonesia dynamic SMEs do not have a broad base in industrial structure and are ignored at policy levels as being too big to be small and too small to big. Berry and Levy (1999: 31) characterised this industrial phenomenon in Indonesia as a "missing middle." The "missing middle" results in the underutilisation of productive capability that viable SMEs potentially have.

[23] In addition to small-scale enterprises, medium-scale enterprises have recently been defined by the government as firms with assets of Rp 200 million to Rp 10 billion or with sales of Rp 1 billion to Rp 50 billion. This definition can include larger SMEs. Based on these capital and sales criteria, however, firms cannot easily or quickly be classified into size categories when data from BPS or our field survey are used.

definition has been used by Bank Indonesia, the central bank, and by the State Ministry of Cooperatives and Small & Medium Enterprises (MOCSME).

Table 4.10 Definition of Manufacturing SMEs in Asian and Pacific Countries

Country/ Organization		*Definition of Manufacturing SMEs* *Criterion*	*Size* [1]
Indonesia	BPS[2]	Employment	SMEs < 100
	MOIT[2]	Assets	SMEs < Rp 5 billion (US$ 0.7 million)
	Bank Indonesia/ MOCSME[2]	Assets	SMEs ≤ Rp 10 billion (US$ 1.4 million)
		Sales	SMEs ≤ Rp 50 billion (US$ 7 million)
Japan		Employment	SMEs < 300
		Invested Capital	SMEs < ¥ 300 million (US$ 3 million)
Korea		Employment	SMEs ≤ 300
Malaysia		Invested Capital	SMEs ≤ MR 2.5 million (US$ 0.7 million)
Philippines		Employment	SMEs < 200
		Assets	SMEs ≤ P 60 million (US$ 1.5 million)
Singapore		Assets	SMEs ≤ S$ 15 million (US$ 9 million)
Taiwan		Employment	SMEs < 200
		Invested Capital	SMEs ≤ NT$ 60 million (US$ 2 million)
Thailand	Bank of Thailand	Employment	SMEs < 300
	MOI[3]	Employment	SMEs < 200
	MOI[3]	Assets	SMEs < 100 million baht (US$ 2.7 million)
Canada		Employment	SMEs < 500
		Sales	SMEs ≤ CDN$ 20 million (US$ 14 million)
USA		Employment	SMEs < 500

Notes: 1) Figures in parentheses in this column indicate the amount in terms of US dollars converted by respective exchange rates at the end of 1999 (IMF, *International Financial Statistics*). Indonesia: US$ = Rp7,085, Japan: US$ = ¥102.20, Malaysia: US$ = MR3.80, Philippines: US$ = P40.31, Singapore: US$ = S$1.67, Taiwan: US$ = NT$31.40, Thailand: US$ = 37.52baht, and Canada: US$ = CDN$1.44.

2) BPS = Statistics Indonesia, MOIT = Ministry of Industry and Trade, and MOCSME = the State Ministry of Cooperatives and Small & Medium Enterprises.

3) MOI = Ministry of Industry.

Sources: APEC (1994: 10-2) and JSBRI (1998: 6).

Table 4.10 indicates that most of the neighbouring countries adopt the number of workers as their main criterion which distinguishes SMEs from LEs and they often use the size of 200 to 500 employees as a cutoff between SMEs and LEs. For instance, Japan, South Korea and Thailand regard manufacturing firms as SMEs if their number of employees is less than 300 workers. In addition, this study aims to cover not only SMEs that can be promoters of distributional or welfare goals but specifically SMEs that can be a driving force in the process of industrialisation. Attention is paid to the "missing middle" or potential and dynamic SMEs. For these reasons, it seems appropriate to define in this study SMEs in Indonesia as enterprises with 299 or less employees.[24]

4.3.2 Policies and Measures for SME Development in Indonesia

The Indonesian government has advocated the importance of SMEs in many official statements. It has formulated and implemented various types of policies and measures aimed at the development of the SME sector. For example, in Repelita VI (the Sixth Five-year Development Plan during 1994/95-1998/99), the government emphasised the promotion of SMEs, aiming mainly at 1) creating employment and 2) improving huge imbalances of income distribution across regions and ethnic groups. Table 4.11 provides a chronological overview of the policies, programs and organisations relevant to the promotion of SMEs in Indonesia.

Table 4.11 reveals that the Indonesian government has tried almost all types of SME support at one time or another. The BIPIK (small industries development)

[24] In support of this definition, we can refer to Goeltom (1995: 18) who, in her empirical analysis on the effects of financial reforms in Indonesia on the manufacturing industry, classified firms as small if the number of employees is less than 100, medium if the number of employees is between 100 and 500, and large if the number of employees is more than 500. This definition allowed her to evaluate in detail the impact of financial liberalisation on larger SMEs that have not usually been focused on.

program was introduced in 1974 and carried out as one of the main technical support programs for small-scale industry. Under this program, technical assistance was extended to small enterprises through UPTs (technical service units) staffed by TPLs (extension field officers). After the BIPIK program finished in 1994, the PIKM (small-scale enterprises development) project was launched and has continued until now. However, because of budget constraints and institutional problems, the UPTs-TPL system has not functioned well. Consequently, the PIKM has not been able to provide small industry with sufficient technical support.[25]

As financial support programs, the government initiated the KIK (credit for small investment) and the KMKP (credit for working capital) in 1973 and continued them in the 1980s. In 1990, however, because of high default rates and budget constraints of the government, such subsidised credit programs were abolished and, instead, the non-subsidised KUK (credit for small businesses) scheme was established (Thee 1994: 101-4). During the last five to ten years, the main credit programs available to SMEs have been: 1) the KUK (credit for small businesses) scheme, which requires banks in Indonesia to allocate 20 percent of their lending to small-scale firms; and 2) the Liquidity Credit Scheme, which restarted in 1998 and provided credits to farmers, cooperatives and SMEs. Despite these programs, only around 10 percent of SMEs use bank credit and the remaining 90 percent do not receive loans from formal financial institutions (Urata 2000: 16-32).

From 1976 to 1993, the government attempted to foster small- and medium-scale parts supplier firms through the Deletion (localisation) programs for some import-

[25] UPTs are public technical institutions specialising in technical support for SMEs. In the middle of the 1990s, the Indonesian Ministry of Industry and Trade (MOIT) stopped allocating a budget to UPTs and they have since then faced serious financial difficulties. The number of UPTs declined from more than 160 in the peak period of the 1980s to around 80 in 1997. When the author visited the UPT in PIK Pulogadung of Jakarta in October 1999, it had six staff members who managed their operations on a very limited budget of Rp 2,000,000 (around US$ 300) per month.

substitution products, such as commercial vehicles, motorcycles and diesel engines. Recognising that inter-firm linkages would be a key to the development of SMEs, the Indonesian government initiated a forced subcontracting program, known as the Bapak Angkat (foster-father) program.[26] However, these programs did not achieve significant results. LEs did not participate in the programs in a positive way, because the forced subcontracting linkages tended to provide them with only limited benefits.

Even though several ministries and organisations in the government sector such as MOIT and MOCSME have experimented with various kinds of programs for the promotion and protection of SMEs, most of them were not effective or did not function well. Thee (1994) attributed these outcomes to insufficient institutional capabilities of the government sector as well as inadequate design of policies and programs. Berry, Rodriguez and Sandee (2001: 377) suggested that unproductive assistance to small firms extended by public agencies be ascribed to a philosophy that the government should guide and help weaker groups in society, many of which comprise people who work in the SME sector. Such motivations have induced the government to extend free support services not to viable medium-scale enterprises but to innumerable micro- and small-scale enterprises. By spreading the effort over so many firms, the public sector has tended to provide "one-shot" support to micro- and small-sized enterprises only, without sufficient follow-up services.

[26] The "Foster Father-Business Partner" partnership and linkage program (Program Kemitraan dan Keterkaitan Bapak Angkat-Mitra Usaha) was introduced in 1984 to promote the development of local SMEs. The program urged LEs as the "Foster Fathers" to support SMEs as small "Business Partners" through the establishment of subcontracting relationships. The government expected LEs to provide SMEs through these forced linkages with assistance in the areas of technology, management, marketing, financing and so on. For further details, see Thee (1994: 106-7).

Table 4.11 Policies, Programs and Organisations for SME Development in Indonesia

Technology	1969	MIDC (Metal Industry Development Center) established.
	1974	BIPIK (Small Industries Development) Program formulated as a technical support program for SMEs.
	1979	Under BIPIK program, LIK and PIK (Small Industrial Estates) constructed and technical assistance extended to SMEs in or near LIK/PIK mainly through UPT (Technical Service Units) staffed by TPL (Extension Field Officers).
	1994	BIPIK program finished and PIKM (Small-scale Enterprises Development Project) launched.
Marketing	1979	Reservation Scheme introduced to protect markets for SMEs.
	1999	Anti-Monopoly Law enacted.
Financing	1971	PT ASKRINDO established as a state-owned credit insurance company.
	1973	KIK (Credit for Small Investment) and KMKP (Credit for Working Capital) introduced as government-subsidised credit programs for SMEs.
	1973	PT BAHANA founded as a state-owned venture capital company.
	1974	KK (Small Credit) administered by BRI (Indonesian People's Bank) launched and later (1984) changed to KUPEDES scheme (General Rural Savings Program) aimed at promoting small business.
	1989	SME Loans from state-owned enterprises (1 to 5 % benefits) introduced.
	1990	Government-subsidised credit programs for SMEs (KIK/KMKP) abolished and unsubsidised KUK (Credit for Small Businesses) scheme introduced.
	1998	The Liquidity Credit Scheme restarted.
	1999	The responsibility of directed credit programs transferred from Bank Indonesia (the central bank) to PT PNM (State-owned Corporation for SMEs) and Bank Export Indonesia.
	2000	Major government credit programs for SMEs, including KUK, abolished.
General	1973	Ministry of Light Industry and Ministry of Heavy Industry merged into Ministry of Industry.
	1976	Deletion (localisation) Programs for commercial cars introduced (motorcycles in 1977 and some other products such as diesel engines and tractors later on).
	1978	Directorate General for Small-scale Industry established (in Ministry of Industry).
	1984	Foster Father (*Bapak Angkat*) Program introduced to support SMEs.
	1991	Foster Father-Business Partner Linkage extended to a national movement.
	1991	SENTRAs (Groups of Small-scale Industry) in industrial clusters organised as KOPINKRA (Small-scale Handicraft Cooperatives).
	1993	Deletion Programs for the commercial cars finished and Incentive Systems adopted.
	1993	Ministry of Cooperatives started handling small business development.
	1995	Basic Law for Promoting Small-scale Enterprises enacted.
	1997	Foster Father (*Bapak Angkat*) Program changed to Partnership Program (*Kemitraan*).
	1998	Ministry of Cooperatives and Small Business added medium business development to its responsibilities.
	1998	SME promotion emphasised in People's Economy as a national slogan.
	1999	New Automobile Policy announced and Incentive Systems finished.

Sources: Thee (1994: 101-11), internal documents prepared by the Indonesian Ministry of Industry and Trade, and author's interview survey.

4.3.3 An Overview of SME Development in Indonesia

As was already observed, Indonesia experienced dynamic economic development through the rapid growth of its manufacturing industry after the early 1970s. The LE sector, particularly in those subsectors that allowed specialisation in labour-intensive assembling operations and a shift toward export-oriented production, played an important role in this remarkable industrial development (Berry, Rodriguez and Sandee 2001: 364). How did the SME sector contribute to the development of the manufacturing industry? This subsection examines the role of SMEs in the process of industrial and economic development in Indonesia.

Table 4.12 indicates that LEs with 300 or more employees recorded generally higher growth rates of value added and employment than SMEs with 299 or less employees. During 1986-99, value added and employment of SMEs in manufacturing as a whole expanded at average annual rates of 6.4 percent and 4.5 percent, lower than those of LEs. Annual value added growth of smaller SMEs (including microenterprises) with 19 or less workers was less than 4 percent, while that of medium and larger SMEs with 20 to 99 workers and with 100 to 299 workers was 7.5 percent and 8.1 percent, respectively.

During 1996-99, however, output in the entire manufacturing SME sector decreased by 0.1 percent per annum, significantly less than the decrease of output in the LE sector of 3.2 percent. Within the SME sector, medium to larger SMEs with 20 to 299 employees responded more flexibly to the sudden changes in economic conditions than smaller SMEs with 19 or less employees.

It is necessary to recognise that the impact of the economic crisis on SMEs has been different in each case. Case studies conducted by the Center for Economic and

Social Studies (1999) show that small-medium supplier firms in heavy equipment, snack food and telecommunication equipment have suffered losses from the economic crisis, while those in rattan handicrafts have experienced the crisis as a boom. According to a case study conducted by Sandee, Andadari and Sulandjari (2000), the furniture industry in Jepara on the north coast of Central Java did well in flexibly adjusting to changes in economic conditions. Small-scale furniture producers in Jepara have been successful in expanding their export production since the outbreak of the economic crisis, due to a low rupiah exchange rate and their low dependence on imported inputs. Tambunan (2000: 143-53, 160-1) pointed out that the influence of the financial crisis on SMEs depends on the kinds of products, types of input materials and destination of products. Sato (2000b) stated, based on her case study of the metalworking industry in Java, that an evaluation of the damage caused by the crisis to the SME sector is not easy, because sufficient statistical data for small firms with 19 or less employees are not available. In addition, she noted that the impact on SMEs is quite heterogeneous according to factors such as firm size (even within SMEs), sector (even within metalworking), location and market orientation.

The selected sectors in Table 4.12, food (ISIC 31), textiles and apparel (ISIC 32) and machinery (ISIC 38) show almost the same trend as manufacturing as a whole. SMEs as a whole in the machinery sector recorded a higher growth of value added during 1986-99 than their counterpart SMEs in manufacturing as a whole and in other selected sectors. In terms of the growth of value added and employment, medium and larger machinery SMEs with 20 to 299 employees were outstanding during 1986-96. They were able to take advantage of an opportunity to supply parts and components to rapidly growing LEs during the period of high growth.

Table 4.12 Growth of Value Added and Employment in Indonesia's Non-Oil/Gas Manufacturing Industry by Firm Size, 1986-1999[1)]

Sector/Firm Size [2)]	*Average Annual Growth Rates (%)* [3)]					
	1986 -1996		*1996 - 1999*		*1986 - 1999*	
	Value Added	*Employment*	*Value Added*	*Employment*	*Value Added*	*Employment*
Manufacturing						
1 - 19	7.7	6.6	-7.8	-2.6	3.9	4.4
20 - 99	9.4	5.7	1.3	-1.6	7.5	3.9
100 - 299	8.8	7.8	5.7	-0.2	8.1	5.9
SMEs	8.5	6.6	-0.1	-2.3	6.4	4.5
LEs	13.3	11.1	-3.2	0.6	9.3	8.6
All Firm Sizes	11.8	7.7	-2.4	-1.5	8.3	5.5
Food (31)						
1 - 19	6.8	7.2	-6.8	-4.8	3.5	4.3
20 - 99	7.9	4.2	4.9	-1.7	7.2	2.8
100 - 299	9.5	5.2	20.4	1.7	11.9	4.4
SMEs	7.8	6.9	5.3	-4.3	7.2	4.2
LEs	9.4	4.5	7.2	0.6	8.9	3.6
All Firm Sizes	8.9	6.5	6.7	-3.5	8.4	4.1
Textile and Apparel (32)						
1 - 19	11.9	8.5	-12.5	-2.2	5.7	5.9
20 - 99	2.8	5.1	0.0	-3.4	2.1	3.1
100 - 299	4.2	8.4	14.8	-0.1	6.6	6.4
SMEs	7.1	8.0	-0.3	-2.1	5.3	5.6
LEs	10.3	16.0	-0.6	0.0	7.7	12.1
All Firm Sizes	9.5	11.2	-0.5	-1.0	7.1	8.3
Machinery (38)						
1 - 19	8.7	5.1	-9.9	-2.8	4.1	3.2
20 - 99	9.8	6.4	12.0	-0.4	10.3	4.8
100 - 299	13.4	8.4	-4.6	-3.7	8.9	5.5
SMEs	11.7	6.1	-1.4	-2.6	8.5	4.1
LEs	22.5	13.5	-7.7	1.0	14.7	10.5
All Firm Sizes	19.7	9.1	-6.6	-0.8	13.0	6.8

Notes: 1) Oil and gas subsectors (ISIC 353 and 354) are excluded.
2) The numbers in parentheses represent ISIC industrial code. Firm size is indicated in terms of the number of employees: SMEs = firms with 299 or less workers; and LEs = those with 300 or more workers.
3) The growth of value added is calculated using 1993 constant prices.

Sources: Calculated from BPS, unpublished data of *Large and Medium Manufacturing Statistics*, *Economic Census* (1986 and 1996), and *Statistical Year Book of Indonesia*.

Table 4.13 Share of SMEs in Indonesia's Non-Oil/Gas Manufacturing Industry, 1974/75-1999[1)]

Sector[2)]	Share of SMEs in All Firm Sizes (%)[3)]											
	Number of Establishments				*Number of Employees*				*Value Added*			
	1-19	*20-99*	*100-299*	*1-299*	*1-19*	*20-99*	*100-299*	*1-299*	*1-19*	*20-99*	*100-299*	*1-299*
Manufacturing												
1974/75	99.5	0.4	-	-	86.5	-	-	-	22.1	-	-	-
1979	99.5	-	-	-	80.6	-	-	-	22.4	-	-	-
1986	99.2	0.6	0.1	99.9	67.5	6.7	5.8	80.0	15.4	7.3	14.0	36.7
1991	99.3	0.5	0.1	99.9	61.5	5.6	6.4	73.5	11.8	5.7	16.1	33.6
1996	99.2	0.6	0.1	99.9	61.2	5.6	5.9	72.7	10.7	5.9	10.7	27.3
1999	99.1	0.6	0.2	99.9	59.2	5.6	6.1	70.9	9.0	6.6	13.6	29.2
Food (31)												
1974/75	99.5	0.4	-	-	85.3	-	-	-	21.7	-	-	-
1979	99.6	-	-	-	85.7	-	-	-	24.2	-	-	-
1986	99.2	0.6	0.1	99.9	70.9	5.9	3.7	80.5	16.7	5.6	8.1	30.4
1991	99.4	0.4	0.1	99.9	73.8	5.2	3.3	82.3	11.0	3.8	16.9	31.7
1996	99.4	0.4	0.1	99.9	75.7	4.7	3.3	83.7	13.6	5.1	8.5	27.2
1999	99.3	0.5	0.1	99.9	72.8	5.0	3.8	81.6	9.1	4.8	12.3	26.2
Textiles and Apparel (32)												
1974/75	98.6	1.2	-	-	73.8	-	-	-	15.6	-	-	-
1979	98.9	-	-	-	62.8	-	-	-	18.9	-	-	-
1986	98.3	1.3	0.2	99.8	49.1	10.3	8.0	67.4	8.5	6.6	10.4	25.5
1991	98.8	0.8	0.2	99.8	40.2	6.3	7.9	54.4	17.2	4.6	8.9	30.7
1996	98.8	0.8	0.2	99.8	38.4	5.9	6.2	50.5	10.5	3.5	6.3	20.3
1999	98.6	0.9	0.2	99.7	37.0	5.5	6.4	48.9	7.1	3.6	9.8	20.5
Machinery (38)												
1975[2)]	97.4	1.9	-	-	58.2	-	-	-	10.2	-	-	-
1979	98.0	-	-	-	55.0	-	-	-	14.3	-	-	-
1986	96.9	2.2	0.6	99.7	39.5	12.2	14.5	66.2	7.3	8.6	18.4	34.3
1991	95.7	2.7	1.0	99.4	29.2	10.6	14.4	54.2	4.6	6.9	17.9	29.4
1996	96.2	2.4	0.8	99.4	27.1	9.4	13.6	50.1	2.8	3.6	10.8	17.2
1999	95.7	2.8	0.9	99.4	25.5	9.5	12.4	47.4	2.5	6.3	11.4	20.2

Notes: 1) Oil and gas subsectors (ISIC 353 and 354) are excluded.
2) The numbers in parentheses indicate ISIC industrial code.
3) The numbers in the column headings indicate firm size in terms of the number of employees. The mark (-) illustrates unavailability of the data.

Sources: Calculated from BPS, unpublished data of *Large and Medium Manufacturing Statistics*, *Economic Census* (1974/75, 1986 and 1996), and *Statistical Year Book of Indonesia*.

Table 4.13 indicates changes in the size distribution of the Indonesian non-oil/gas manufacturing industry in terms of numbers of establishment, employment and value added since the mid-1970s. In accordance with the typical patterns of size structure in developing economies, the Indonesian economy shows that the shares of SMEs are dominant in terms of establishments and labour force, while LEs generate the majority of manufacturing value added.[27]

The SME group as a whole occupied nearly 100 percent of total establishments, without significant changes across sectors and over time. Among SMEs, those with 19 or less employees formed 95-99 percent of the total. In the case of the machinery sector (ISIC 38), the share of smaller SMEs with 19 or less workers was slightly lower than the two other sectors and manufacturing as a whole and, instead, that of medium and larger SMEs with 20 to 99 workers and with 100 to 299 workers was higher. However, the overwhelming majority of establishments consisted of SMEs.

In manufacturing employment, SMEs also dominated, but their shares declined continuously. In the 1970s, smaller SMEs with 19 or less workers employed more than 80 percent of the total workforce in manufacturing.[28] The employment share of this SME group decreased to 68 percent in 1986 and around 60 percent in the second half of the 1990s. The share of medium and larger SMEs in employment did not change much during 1986-9, and remained above 5 to 6 percent. As a consequence, the employment share of the entire SME sector with 299 or less workers declined from 80 percent to 70 percent between 1986 and 1999. These changes reflect the growth patterns of

[27] Based on the 1986 BPS data, Hill (1992: 244) also stated that the size distribution of Indonesian manufacturing resembles the typical developing country pattern in terms of output and employment.
[28] The levels of the employment and output share of smaller SMEs with 19 or less employees were remarkably different in the 1970s and in 1986. This gap implies that the 1974/75 census and 1979 survey overestimated employment and output of smaller SMEs and/or underestimated those of the remaining firm groups with 20 or more employees. Therefore, it is better to consider the figures of employment and output in the 1970s as rough indications of trend.

employment between different firm size groups, in which LEs grew more rapidly in creating employment than SMEs.

During 1986-99, around 80 percent of employment in food processing (ISIC 31) was at SMEs with 299 or less workers. In this industry, scale economies are less significant and the necessity for on-site processing may actually provide advantages to small-scale operations (Hill 1992: 246). On the other hand, the share of employment at SMEs in the textile and apparel (ISIC 32) and machinery (ISIC 38) sectors clearly decreased over the period.

The share of LEs in value added exceeded that of SMEs and generally increased after the mid-1970s. In manufacturing as a whole, the share of smaller SMEs in value added decreased from more than 20 percent in the 1970s to roughly 10 percent in the latter half of the 1990s. This is the main explanation for the decrease in the share of the entire SME sector in value added. Food (ISIC 31), textiles and apparel (ISIC 32) and machinery (ISIC 38) reveal similar trends over time in the share of value added between different firm size groups.

Although the share of SMEs in value added was relatively small and decreased since the mid-1970s, it is evident that the SME sector contributed significantly to the Indonesian economy in terms of the number of establishments and employment. In addition, it should be noted that our analysis of the size distribution of manufacturing firms was based on the data in the years shown in Table 4.13 (current year series). If this study had used the data classified by firm size in a specific base year or in the year when firms started operations (initial year series), the trend in the share of SMEs in value added would have been different. Aswicahyono, Bird and Hill (1996: 353-4) investigated the distribution of value added by firm size, employing the data based on both the current year and initial year series. According to their analysis on the basis of the current year classification, the share of smaller firms with 20-99 workers in value added declined gradually after the late 1970s. On the other hand, their observation on the data of the initial year series revealed a dynamism of SMEs, showing that the share of the 20-99 firm group in value added was substantially higher than that of the counterpart group based on the current year series, and that the medium group with 100-499 workers expanded remarkably after the mid-1980s. This implies that firms starting from small- and medium-scale operations tend to grow more dynamically than those from large-scale operations.

4.4 Economic Performance and Productivity Growth of the Indonesian Manufacturing Industry by Firm Size

This section analyses the development of SMEs in Indonesia, based on the national-level statistical data. The economic performance of manufacturing enterprises by firm size is discussed in the first part, while the growth of labour productivity and total factor productivity (TFP) are calculated for SMEs and LEs separately in the second part.

4.4.1 Economic Performance of SMEs and LEs in Indonesia

It is useful to compare economic performance of manufacturing SMEs and LEs in order to understand the characteristics of production structure in both groups. For this purpose, our study uses the unpublished *Large and Medium Manufacturing Statistics* of BPS, which gives value added (Y), the number of employees (L), and wage rates (ω, defined as total labour costs divided by the number of workers) by firm scale during 1986-99. As explained before, since BPS's backcast data were not available to the author, our study uses its original data. This study estimates capital stock (K) excluding land in 1993 constant prices (see Appendix 4.1 to this chapter). Because of difficulties in estimating capital stock for SMEs with 19 or less workers, these smaller SMEs are not included in our analysis.[29]

What patterns of scale differentials in the economic performance of firms can be found in the Indonesian non-oil/gas manufacturing industry? Are such observations in Indonesia consistent with theoretically expected patterns or those obtained from Japan's experience, as discussed in the previous chapter? Table 4.14 shows productivities, capital intensity, wage rates and income share of labour by firm size in 1986, 1996 and 1999.

Some previous studies (e.g., Berry and Mazumdar 1991: 52; Tajima 1978: 12-5) discussed conditions under which SMEs can compete with LEs. According to the theoretical framework presented in these studies, when capital intensity rises consistently with firm size, labour productivity tends to increase, but (assuming constant returns to scale) less than proportionately to capital intensity, which leads to a decrease in capital productivity. Wages are likely to escalate with firm scale, which is one of the reasons for the increase in capital intensity. However, unless profitability is to decline with firm size, wage rates have to increase less than labour productivity, so that a higher share of value added can be used for investment in fixed capital.

The aggregate manufacturing data for Indonesia indicate a similar trend in three different years before and after the crisis, 1986, 1996 and 1999. Table 4.14 shows that capital intensity (K/L) rises with firm size, albeit with some irregularities. In 1986 and 1996, the peaks in the capital-labour ratio were found in the second largest scale group

[29] Since no time series data on annual investment for firms with 19 or less workers has to our knowledge been available, it is extremely difficult to estimate capital stock for those smaller SMEs.

with 300 to 999 employees. In 1999, on the other hand, capital intensity increased up to a peak in the range of 100 to 299 employees, before levelling off.

Table 4.14 Economic Performance of Indonesia's Non-Oil/Gas Industry by Firm Size in 1986, 1996 and 1999[1)]

	Indices of Indicators (Firm Size 20-49 = 100)[3)]				
Firm Size[2)]	*K/L*	*Y/L*	*Y/K*	ω	$\omega L/Y$ (β)
Manufacturing in *1986*					
20 - 49	100	100	100	100	100
50 - 99	257	165	64	146	89
100 - 299	350	281	80	204	73
300 - 999	378	350	93	203	58
1,000 -	320	388	121	218	56
Manufacturing in *1996*					
20 - 49	100	100	100	100	100
50 - 99	256	262	102	143	55
100 - 299	421	293	69	187	64
300 - 999	431	316	73	209	66
1,000 -	361	499	138	245	49
Manufacturing in *1999*					
20 - 49	100	100	100	100	100
50 - 99	222	258	116	159	61
100 - 299	356	317	89	164	52
300 - 999	342	367	107	172	47
1,000 -	356	335	94	166	50

Notes: 1) Oil and gas subsectors (ISIC 353 and 354) are excluded.
2) Firm size is indicated by the number of employees.
3) Y = value added, L = the number of employees, K = capital stock, ω = wages per employee (wage rates), Y/L = labour productivity, K/L = capital-labour ratio, Y/K = capital productivity, and $\omega L/Y$ = income share of labour.

Source: Calculated from BPS, unpublished data of *Large and Medium Manufacturing Statistics*.

Labour productivity (*Y/L*) increased with size, except for 1999, when the second largest size group recorded the highest productivity level. Capital productivity (*Y/K*) was not consistent with expected patterns. The output-capital ratio first decreased, then increased as firms are larger. Wage rates (ω) rose with firm scale, with an anomaly in 1999, when the second largest size group provided the highest wages. The income share of labour ($\omega L/Y$ or β) fell almost monotonously, with small irregularities in 1996 and 1999. In accordance with normal predictions, labour productivity rose less steeply than capital intensity with the scale of firms, except for anomalies in the largest size group in 1986 and 1996. Similarly, differences in wages between firm groups by scale are less than those in labour productivity.

Compared to Japan in Chapter 3, Indonesia does not show regular patterns in a set of indicators representing the production structure of firms classified by scale. Tajima (1978: 16-27) suggested three possible reasons for these irregularities in developing economies. As a primary reason, he raised statistical problems such as the limited number of sample firms and inaccurate data, particularly for capital stock. This reason is relevant to the case of Indonesia, where the number of sample establishments in the manufacturing industry as a whole in 1996 is around 23,000, far less than that of Japan, observed in Chapter 3.[30] Irregularities are more frequently observed in sectoral performance, because individual characteristics tend to appear in a relatively small sample size.[31] As described above, capital productivity behaves in an irregular fashion in Indonesia. This may be due partly to the limitations of the capital stock estimates.

---

[30] The annual survey of *Large and Medium Manufacturing Statistics* has been conducted in the form of a complete enumeration. In this survey, questionnaires are delivered to all establishments that are considered to employ 20 or more workers and are recorded in the *Manufacturing Industry Directory* compiled by BPS. However, it seems that a large number of eligible firms are not covered in the directory. In fact, this study found several firms in our sample which were not listed in the directory. In addition, the number of manufacturing establishments with 20 or more workers in Indonesia is not large, because of the nascent stage of industrial development. For reference, the number of sample enterprises in Japan in 1957 described in Chapter 3 was more than 400,000.

[31] In a preliminary analysis based on the data in 1996, our study confirmed this tendency in Indonesia.

Tajima's second reason originates from heterogeneity, which often appears in the process of industrialisation in developing economies. The coexistence of traditional and modern production systems, which are likely to have extremely different capital intensities, causes an anomaly in capital-related indicators. For example, compared to other industries, the chemical and basic metal industries in Indonesia are disproportionately dependent on capital-intensive technology. Non-*pribumi* firms seem to be far more capital-intensive than *pribumi* firms. These kinds of heterogeneity may distort capital productivity in Indonesia.

The third reason is related to policy stance of governments towards different-scale enterprises. As noted in the previous section of this chapter, the Indonesian government has introduced and implemented industrial policy measures in favour of LEs. This policy distortion usually generates irregularities in economic performance between different-scale firm groups in the manufacturing sector.

However, our analysis of the Indonesian manufacturing industry generally indicates that: 1) capital intensity, labour productivity, and wage rates rise with firm size; 2) the income share of labour declines with firm scale; 3) the differentials in labour productivity between firm groups by scale are larger than those in wage rates; 4) the differentials in the capital-labour ratio by firm size are larger than those in labour productivity in some cases; and 5) capital productivity falls with firm scale in some cases. These findings confirm that SMEs can in principle coexist with LEs, by producing a unit of output with less capital but more labour than LEs (Berry and Mazumdar 1991: 52; Tajima 1978: 27).

4.4.2 Productivity Growth of SMEs and LEs in Indonesia

As was already observed, the Indonesian non-oil/gas manufacturing industry grew rapidly during the decade prior to the 1997-98 economic crisis. This high growth in manufacturing was led by not only LEs but also SMEs. Table 4.12 showed that, during 1986-96, SMEs increased value added and employment at annual rates of 8.5 percent and 6.6 percent, while LEs raised them at 13.3 percent and 11.1 percent.

This subsection examines the evolution of dynamic forces operative in the manufacturing industry, and assesses changes in productivity for both SMEs and LEs. Similar to the previous subsection, this subsection also uses the unpublished *Large and Medium Manufacturing Statistics* of BPS to obtain the data of value added (Y), the number of employees (L), wage rates (ω), capital stock (K) at a benchmark year and capital fixed investment (I) for SMEs with 20 to 299 employees and LEs with 300 or more employees during 1986-99.[32]

Table 4.15 displays the average annual growth rates of labour productivity (Y/L) for SMEs and LEs in manufacturing as a whole and several selected sectors/subsectors over the period 1986-96. Labour productivity is a useful indicator, because it can represent the efficiency of labour (as an abundant resource in Indonesia) in generating output. In manufacturing as a whole, average labour productivity for SMEs and LEs increased at annual rates of 2.3 percent and 2.2 percent, respectively. The food industry (ISIC 31) maintained high annual labour productivity growth of 4.2 percent and 5 percent for SMEs and LEs, respectively, while labour productivity in the textile and

[32] As stated in Section 4.2, this study uses not BPS's backcast data but its original data. All data are in real terms at 1993 constant prices. Value added (Y), wage rates (ω) and capital fixed investment (I) are deflated by implicit GDP deflator for manufacturing industry from the Indonesian national accounts, consumer price indices from *World Development Indicators 2001* (World Bank) and implicit deflator for gross fixed capital formation from the Indonesian national accounts, respectively. With regard to the capital stock estimates, see Appendix 4.1 to this chapter.

apparel industry (ISIC 32) recorded negative growth at -2.9 percent and -5.6 percent for SMEs and LEs. As already indicated in Table 4.12, even though output in the textile and apparel industry grew remarkably at the rate of 9.5 percent annually during 1986-96, employment increased more rapidly at the annual rate of 11.2 percent. This rapid absorption of employment in the textile and apparel sector is the main explanation for the negative growth rates of labour productivity for SMEs and LEs.

Table 4.15 Growth of Labour Productivity and Total Factor Productivity (TFP) in Indonesia's Non-Oil/Gas Manufacturing Industry, 1986-1996[1)]

	Average Annual Growth Rates (%)[3)]			
Sector[2)]	*SMEs*[4)]		*LEs*[4)]	
	Y/L	*TFP*	*Y/L*	*TFP*
Manufacturing	2.3	1.9	2.2	2.3
Food and Beverages (31)	4.2	-3.5	5.0	-4.0
Textiles and Apparel (32)	-2.9	-6.5	-5.6	2.1
Machinery (38)	4.8	7.5	8.9	4.9
Metalworking (381)	5.9	3.9	2.6	7.0
General Machinery (382)	9.7	16.3	11.3	-19.8
Electrical Equipment (383)	3.6	11.3	8.6	8.6
Automobile Assembling (38431)	-	-	26.7	16.0
Automobile Parts (38432+33)	8.8	10.6	24.2	11.5
Bicycle (38443+44)	6.8	-0.2	22.7	11.4

Notes: 1) Oil and gas subsectors (ISIC 353 and 354) are excluded.
2) The numbers in parentheses indicate ISIC (International Standard Industrial Classification) code.
3) The data at 1993 constant prices are used to calculate the growth of labour productivity and TFP.
4) SMEs = firms with 20 to 299 workers, LEs = those with 300 or more workers.

Source: Calculated from BPS, unpublished data of *Large and Medium Manufacturing Statistics*.

In the machinery sector (ISIC 38), LEs achieved high rates of increase in labour productivity over the period 1986-96. Significant is transport equipment, under which automobile assembling (ISIC 38431), automobile parts (ISIC 38432+38433) and bicycle (ISIC 38443+38444) producing firms all raised labour productivity at more than 20 percent per annum. This implies that LEs improved labour productivity under the conditions in which the demand for their products rapidly grew during the economic boom. On the other hand, the SME sector in the machinery industry raised labour productivity at 4.8 percent annually. Still, most of the machinery subsectors showed a sufficient performance in labour productivity growth. Within the transport equipment subsector, automobile parts (ISIC 38432+38433) and bicycles (ISIC 38443+38444) increased their labour productivity at 8.8 percent and 6.8 percent per year, respectively, under the expansion of their markets in the high economic growth period.

Table 4.15 also shows changes in total factor productivity (TFP), which can indicate technological progress in a broad sense defined as the residual not explained by increases in factor inputs. In this study, the labour input is not adjusted for quality changes, due to the data constraints. The data for capital stock are weak, as Appendix 4.1 explains. The growth of TFP is measured simply as the residual between output growth and factor input increases.[33]

Several studies measured TFP growth in Indonesia. Aswicahyono (1998) and Timmer (1999) are recent and comprehensive studies that focused on TFP in Indonesia's manufacturing industry over the long-term period. They estimated TFP for each sector in the manufacturing industry with the use of technically sophisticated methods. However, no TFP estimates have been undertaken for Indonesia by firm size

[33] Under these conditions, our rough estimates of TFP growth, of course, include observational and approximation errors and do not purely draw technological or institutional development. For further details of this type of growth accounting and the associated errors, see Hayami (1997: 116-9).

category (Berry, Rodriguez and Sandee 2001: 367). Despite its simple approach, this study is the first to measure TFP growth for SMEs and LEs separately.

For the estimates of TFP growth, the following Cobb-Douglas production function is assumed:

$$Y = AF\,(K, L) \tag{4.4.1}$$

where manufacturing value added Y is produced from capital K and labour L under the conditions of neutral technological change and constant returns to scale. By taking total derivatives of equation (4.4.1) with respect to time (t) and dividing all terms by Y, the Cobb-Douglas production function can be written as:

$$g\,(Y) = g\,(A) + \alpha g\,(K) + \beta g\,(L) \tag{4.4.2}$$

where g indicates the growth rates, and α and β represent the income shares of capital and labour, respectively, as equivalent with production elasticities of capital and labour.[34] $g(A)$ is a residual in the growth of Y after the effects of increases in K and L are subtracted. Since value added Y is the sum of capital and labour incomes, α and β add up to one ($\alpha + \beta = 1$). Subsequently, by subtracting $g(L)$ from both sides of equation (4.4.2), the growth of labour productivity can be approximated by:

$$g\,(Y/L) = g\,(A) + \alpha g\,(K/L) \tag{4.4.3}$$

[34] For TFP estimates in this chapter, income share of labour (β) is calculated as the average of $\omega L/Y$ in 1986 and 1996. After that, income share of capital (α) can simply be obtained by subtracting β from 1.

The data for Y, K, L and α ($\alpha = 1 - \beta$) by firm size during 1986-96 are available from the unpublished BPS source *Large and Medium Manufacturing Statistics*, as explained before. With the use of these data, $g(A)$, the growth of residual or TFP, can be calculated by subtracting measured $\alpha g(K/L)$ from measured $g(Y/L)$ based on the relation of equation (4.4.3).

In the manufacturing industry as a whole, TFP for SMEs grew at 1.9 percent per year, which is slightly lower than that for LEs of 2.3 percent. Both manufacturing SMEs and LEs in Indonesia demonstrated technological advance during 1986-96. The levels of these TFP growth rates are similar to those given by Osada (1994: 482) and Timmer (1999: 86-7), which estimated 3.6 percent during 1985-90 and 2.1 percent during 1991-95, respectively, as the aggregate TFP growth in manufacturing.

SMEs in the food processing (ISIC 31) and textile and apparel (ISIC 32) industries recorded annual TFP growth of -3.5 percent and -6.5 percent, respectively. Value added and labour productivity for SMEs and LEs in the food processing sector increased at remarkable rates. However, the growth of capital input was more rapid than that of output. As a consequence, TFP growth for both firm groups became negative. This result is not significantly different from that of Osada (1994: 482), which indicated annual TFP growth of -1 percent for the food processing industry during 1985-90.

In the textile and apparel industry, some possible explanations for the negative TFP growth of the SME group may be considered. A significant increase in investment in this industry during the period of export boom seems to have surpassed the capacity of SMEs to absorb it. A series of economic reforms since the early 1980s may have had some adverse effects on an improvement of efficiency for textile and apparel SMEs. However, TFP for LEs increased at a modest rate of 2.1 percent per year and the textile and apparel industry as a whole including both SMEs and LEs indicated a positive growth of 1 percent per annum. This rate is lower, but not substantially different from that of Aswicahyono (1998: 218) and Timmer (1999: 87), which presented annual TFP growth rates of 2.4 percent during 1989-93 and 3.6 percent during 1991-95, respectively.

In the machinery industry (ISIC 38), SMEs and LEs showed TFP growth of 7.5 percent and 4.9 percent per year, respectively. Most of the machinery subsectors recorded significant TFP growth of SMEs and LEs, with some exceptions such as general machinery (ISIC 382). SMEs in automobile parts (ISIC 38432+38433) experienced rapid TFP growth of more than 10 percent annually. These estimates are consistent with those of Timmer (1999: 87), which reported that TFP in the machinery sector as a whole grew at an average rate of 6.9 percent per annum during 1991-95.

SMEs in the Indonesian machinery sector increased TFP to a significant degree during 1986-96. How were these SMEs able to achieve such high rates of TFP change? An increase in TFP can be achieved through the development of technology. Technological upgrading in this context includes not only investment in better machinery and equipment but also improvement in production technology, product design, quality management, workplace organisation, inventory management and so on. However, as Berry, Rodriguez and Sandee (2001: 363) pointed out, the majority of SMEs are generally less able to improve such areas successfully on their own than LEs. From this point of view, subcontracting ties with LEs may possibly have been an important source of technological improvement for SMEs, as described in the previous chapters. It seems reasonable to hypothesise that the rapid TFP growth of Indonesian machinery SMEs in 1986-96 can be attributed to some extent to the role of subcontracting in providing them with opportunities to acquire knowledge of how to upgrade technological capabilities.

In general, due to the sectoral characteristics such as the divisibility of production processes and the products for use as intermediate inputs, SMEs and LEs in the machinery industry tend to establish subcontracting linkages more frequently than other manufacturing industries (Odaka 1978: 245-6).[35] Van Diermen (1997: 171) concluded that vertical inter-firm linkages in garment and wood furniture subsectors in Jakarta were not very frequent and did not play a significant role in the development of SMEs. Other studies, for instance, Berry and Levy (1999) and Sandee, Andadari and Sulandjari (2000), discussed subcontracting SMEs in garment and furniture sectors in Indonesia. However, most of the case studies on subcontracting in Indonesia deal with the machinery industry. For example, Harianto (1996: 60) pointed out that subcontracting linkages in the machinery sector (bicycle and pumps for oil as his specific cases) have been intense because of the nature of the production processes and technologies, the quality standard required in the final markets and the competitiveness of the markets. Altogether, these studies suggest that vertical inter-firm linkages occur relatively more frequently in the machinery sector than in other sectors.

The high TFP growth of SMEs in automobile parts corresponds to the remarkable TFP growth of LEs in automobile assembling (ISIC 38431) and LEs in automobile parts. The latter groups are business counterparts for the former group as principal firms or higher-layer supplier firms. This suggests that small-medium automotive parts supplier firms obtained benefits such as knowledge of production technology and advice on management from large automobile assembler firms or large automotive component supplier firms, possibly through their subcontracting linkages.

[35] Of course, the extent of such interrelations varies from country to country.

4.5 SMEs and Subcontracting in Indonesia

Many of the case studies on subcontracting linkages in the Indonesian manufacturing industry focused on the machinery sector. Based on the available literature, Table 4.16 summarises several types of support for small-medium supplier firms extended by large parent firms through subcontracting transactions in the machinery industry in Indonesia.

Thee (1985) reported subcontracting linkages between small-scale metalworking and machinery parts supplier firms and large-scale diesel engine assembler firms in the early 1980s. This case study found that some kinds of assistance were provided to small firms through vertical inter-firm linkages such as QC (quality control) support, credit, supply of raw materials and managerial training (Table 4.16). Thee concluded, however, that subcontracting networks remained weak and fluid, and did not sufficiently improve the technical and other capabilities of SMEs. The results of Thee's study may reflect the stage of Indonesian industrial development in the early 1980s, when the market was not expanding rapidly, the economy was still in its industrial infancy, and technological gaps between what small enterprises could manage and what large assemblers expected were considerable (Hill 2001: 249).

In the 1990s, several studies investigated the role of subcontracting in SME development. Harianto (1996) analysed characteristics of subcontracting transactions in local Indonesian firms in the early 1990s, taking bicycle, pumps for oil and trading of garment products as his cases. A large manufacturer of oil pumps provided its subcontracting SMEs with support in several areas, particularly technology and finance. Similarly, a large bicycle assembler firm extended technical, QC and managerial support to small-scale supplier firms through the dispatch of engineers. The parent firm sometimes involved its subcontractors in parts design and organised study tours that took them to foreign bicycle industries in, for example, Taiwan. Through subcontracting, the bicycle assembler firm also gave its parts supplier firms opportunities to negotiate price levels based on the cost plus fee method. Harianto found that the expected benefits from subcontracting transactions prevented both supplier and assembler firms from pursuing short-term gains by behaving opportunistically. The bicycle assembler firm recognised the benefits of subcontracting linkages including information on the technical and managerial reliability of supplier SMEs, while SME parts suppliers perceived gains such as information on the production plans of the assembler firm and large and continuous orders in the longer term.

Sato (1998a) traced the development of subcontracting networks in the Indonesian motorcycle industry in the mid-1990s. She observed that lower-layer (second- and third-layer) parts supplier firms had emerged relatively recently and that under multi-strata subcontracting chains, SME support had been extended by both higher-tier supplier firms and assembler firms. In her case study, one large-scale motorcycle manufacturer provided assistance in establishing a first-tier supplier firm owned by an ex-employee. The first-tier parts producer, in turn, assisted its employees to spin out of the firm to establish new enterprises that served it as second- or third-tier supplier firms. It provided these spin-off supplier firms with various forms of assistance including technical, managerial, marketing and financial support.

Supratikno (1998) investigated subcontracting arrangements as a competitive strategy and production organisation for assembler firms in the mid-1990s, looking in detail at three assembler firms engaged in the production of motorcycles, diesel engines and brass handicrafts. Supratikno concluded that subcontracting relationships can facilitate the growth of supplier SMEs and help them overcome development constraints such as unstable markets and low quality and technology, although the contribution of subcontracting to the competitiveness of parent firms was not significant.

Other than the machinery industry, subcontracting linkages in the garment and furniture industries have been studied. On the basis of case studies involving rattan furniture, wooden furniture and garments production, Berry and Levy (1999: 50) pointed out that subcontracting is a prevailing way of channelling SME products into export markets and that it has played an important role in disseminating technologies relevant for export production to SMEs. A case study focusing on the wooden furniture industry in Jepara (Central Java) allowed Sandee, Andadari and Sulandjari (2000: 190) to conclude that QC, standardisation and sophisticated finishing provided by LEs through subcontracting ties enabled small-scale furniture producers to participate in export production.

These case studies demonstrate that in the 1990s subcontracting networks beneficial to SME development have emerged in Indonesia's manufacturing industry, particularly the machinery industry.[36] Larger SMEs as well as competent LEs often played an essential role in activating subcontracting in Indonesia. The emergence of those subcontracting ties can be seen as a response to rapid market expansion and industrial development which increased the opportunities for firms to explore mutually beneficial subcontracting relations. Through vertical inter-firm linkages, SMEs have been offered various forms of support, particularly in the areas of technology and marketing. The above findings on the evolution of subcontracting ties between SMEs and LEs are not very unusual cases but a recent tendency especially in the machinery industry (Hill 2001: 263).

[36] This development of subcontracting linkages between SMEs and LEs was consistent with government policy such as the deletion programs and the Bapak Angkat (foster-father) programs. However, the above case studies did not indicate that these government programs significantly supported the promotion of subcontracting transactions in the private sector in a direct or indirect manner.

Table 4.16 Support from Parent Firms through Subcontracting Linkages in Indonesia's Machinery Industry

	Diesel Engines	*Pump Units for Oil*	*Bicycles*	*Motorcycles*
Technical Support	· provision of QC support · provision of technical specification	· provision of technical support in production processes and inspection via dispatch of 6 experts · selection of proper production equipment	· provision of technical and QC support through dispatch of experts · dispatch of suppliers to foreign markets as study tour · involvement of suppliers in design phase	· preparation for training programs in QC and production technologies (e.g., dies making) · frequent evaluation on suppliers' performance (e.g., QCD)
Financial Support and Price Setting	· provision of loans for suppliers · provision of credit guarantees for suppliers · lending of machinery · price negotiation between parent and supplier firms	· setting of favourable payment · conditions provision of loan guarantees for · suppliers supply of used equipment at low cost	· setting of favourable payment conditions (limited) · price negotiation, adopting cost plus fee method	· provision of loan guarantees for suppliers
Supply of Input Materials	· provision of raw materials	· supply of input materials	· supply of input materials (very limited)	· supply of input materials
Managerial Support	· provision of managerial training for small industry	· provision of managerial support through dispatch of experts	· provision of managerial support	· preparation for training programs in managerial fields (e.g., accounting)
Other Support		· assistance in establishing supplier firms	· assistance in establishing supplier firms · assistance in finding other customers	· assistance in establishing supplier firms · support by higher tier suppliers to lower tier suppliers
Observation Period	· the first half of the 1980s	· the early 1990s	· the early 1990s	· the mid-1990s

Sources: Diesel engines: Thee (1985); pump units for oil and bicycles: Harianto (1996); and motorcycles: Sato (1998a).

Since nation-wide statistical data on inter-firm linkages are available in Japan, it is possible to measure the impact of subcontracting on the development of SMEs in a quantitative and comprehensive way.[37] However, the lack of such data in Indonesia has prevented us from generalising the role of subcontracting in supporting the SME sector. Therefore, several studies described in this chapter and other literature that focused on SMEs and vertical inter-firm linkages in Indonesia used a descriptive and case study approach with the use of micro-level and qualitative information. Similarly, this chapter itself also cannot sufficiently examine the relationships between subcontracting and changes in productivity of SMEs. For the purpose of overcoming such constraints, the subsequent chapters in this study are designed to investigate SME development through subcontracting in Indonesia based on a micro-level survey that covers not only qualitative but also quantitative aspects.

4.6 Conclusion

The Indonesian economy grew rapidly and its structure transformed substantially during the three decades before the 1997-98 crisis. Agriculture lost its dominant share in output and employment, while industry, in particular manufacturing, gained prominence.

Although Indonesia formulated a variety of policies for the promotion of SMEs, most of them were not effective or did not work well, due to inadequate designs of programs and insufficient implementation capabilities of the government sector. The performance of the LE sector was generally better than that of the SME sector. However, along with LEs, SMEs developed reasonably well in terms of output and

[37] See Hondai (1992) and Urata (1995), both of which were referred to and analysed in Chapter 3.

employment growth. In particular, SMEs in the machinery sector recorded good results. The share of SMEs in value added was relatively small, but the SME sector contributed to a great extent to the Indonesian economy in terms of the number of establishments and labour force. The impact of the 1997-98 crisis on SMEs was different in each case.

The analysis of economic performance in the Indonesian manufacturing industry by firm size indicates that: 1) capital intensity, labour productivity, and wage rates rise with firm size; 2) the income share of labour declines with firm size; 3) the differentials in labour productivity between firm groups by size are larger than those in wage rates; 4) the differentials in capital-labour ratio by firm size are larger than those in labour productivity in some cases; and 5) capital productivity falls with firm size in some cases. Despite several irregularities, these findings support in broad terms the suggestion that SMEs can coexist with LEs, by producing a unit of output with less capital but more labour than LEs (Berry and Mazumdar 1991: 52; Tajima 1978: 27).

In Indonesian manufacturing as a whole, SMEs and LEs increased labour productivity at a similar rate during 1986-96. SMEs in the machinery industry increased labour productivity faster than SMEs in other main sectors. SMEs in the machinery industry also increased their TFP markedly, compared with SMEs in other key sectors, and even compared with LEs in the same sector. The machinery sector stands out for its closer subcontracting ties between SMEs and LEs than in other sectors. It therefore seems that subcontracting ties may help understand the better performance of SMEs in this sector, as they may have contributed to improvements in efficiency and technology during the economic boom period 1986-96. Thus, similar to Berry, Rodriguez and Sandee (2001), the rest of this study seeks to test the hypothesis that subcontracting was a key factor in improving the performance of SMEs in Indonesia.

As Hill (2001: 270) pointed out, more micro-level SME case studies are required to understand the factors affecting dynamic changes in the performance of the Indonesian SMEs. The rest of this study provides a detailed investigation into how, to what extent and why subcontracting has contributed to the development of SMEs in the machinery industry. The next chapter explains the design of our firm-level survey focusing on subcontracting relationships between SMEs and LEs in the metalworking and machinery industries.

Appendix 4.1 Estimation of Capital Stock in the Manufacturing Industry

The estimation of fixed capital stock in the Indonesian manufacturing industry is based on the following formula:

$$K_t = (1 - \delta)\, K_{t-1} + I_t$$

where K_t is fixed capital stock in year t, K_{t-1} fixed capital stock in year t-1, δ the average depreciation rate in year t, and I_t annual fixed capital investment in year t. This procedure was used to calculate the real value of fixed assets. These data by firm size exclude land and are from BPS's unpublished *Large and Medium Manufacturing Statistics*. The values of annual fixed capital investment are deflated by the deflator of gross fixed capital formation (1993 = 100) from the Indonesian national accounts. The average depreciation rate is taken to be 7 percent per annum. This is an average of the rates of depreciation in different categories of capital stock; 5 percent (buildings where the period of depreciation is 20 years), 6.7 percent (machinery 15 years), 10 percent (vehicles 10 years), and 15 percent (other items 7 years).[38] The average was obtained as a weighted average, using the shares of these fixed assets in the total for 1988 and 1995. Since BPS does not have the values of annual fixed capital investment in 1996, they were estimated as a simple average of the values in 1995 and 1997.

In accordance with the above formula, this study added the real value of annual fixed capital investment to the value of fixed assets in 1988, with an annual adjustment

[38] These depreciation rates are based on the information from firms we visited during the 1999-2000 field survey in Indonesia. The service lives adopted by this study are similar to those used by Goeltom (1995: 84) and Timmer (1999: 80), which suggested 30 years for buildings, 10 years for machinery and 5 years for vehicles and other equipment.

of 7 percent for depreciation, to obtain the values of fixed capital stock (*K*) in the 1993 constant prices during 1989-99. The data on fixed assets in 1988 are the oldest ones by firm size available to us. Fixed capital stock in 1986 and 1987 was estimated by deducting annual fixed capital investment in 1993 constant prices in the previous year with an adjustment of depreciation, working backwards from 1988.

Chapter 5

Introduction to Micro-level Survey in Indonesia

5.1 Introduction

As explained in the previous chapters, this study hypothesises that the existence of vertical inter-firm linkages has been a factor that helped SMEs in Indonesia improve their capabilities and performance. Studies of small-medium enterprises based on a manufacturing database at the national level, as presented in Chapter 4, are of limited value to investigate this hypothesis. A comprehensive survey on subcontracting linkages has never been carried out in Indonesia. The existing literature, as discussed in Chapter 4, offers only incomplete data and information on the relevance of subcontracting transactions. For these reasons, this study obtained primary data and information on firms through a firm-level interview and questionnaire survey in Indonesia. This chapter and the following four are based on the results of this detailed firm-level survey in the metalworking and machinery industries.

This chapter provides an introduction to our micro-level survey in Indonesia. Section 5.2 illustrates the background of our field survey in Indonesia and discusses issues such as the timing of survey, the collaborative organisations, and the impact of the 1997-98 economic crisis on the machinery industry. Section 5.3 explains the technical issues of our firm-level survey including the sampling procedures. Sections 5.4 and 5.5 provide an overview of the basic characteristics of the sample SMEs and their subsectors.

5.2 Background of the Field Survey in Indonesia

Our field survey in Indonesia was undertaken during August 1999-March 2000, in the aftermath of the 1997-98 economic crisis. Its aim was to obtain firm-level data and information on metalworking and machinery SMEs. These were collected from SMEs themselves and large-scale assembler firms through an interview and/or questionnaire survey. In addition, supplementary data and information were collected from government agencies, industrial associations, financial institutions and other organisations related to SME development. This industry survey in Indonesia was conducted in cooperation with Japan International Cooperation Agency (JICA) and the Indonesian Ministry of Industry and Trade (MOIT), but the results and interpretations presented in this study are entirely independent from the views of these organisations.

Because of the timing of the survey, the data obtained from our interview and questionnaire survey reflect effects of the 1997-98 crisis on the sample SMEs. As observed in Chapter 4, the negative consequences of this crisis have been significant for the Indonesian manufacturing industry as a whole. The collapse of the rupiah along with some other factors such as a rapid expansion of money supply drove inflation up roughly 58 percent in 1998, which intensified macroeconomic instability. After year-on-year GDP growth slowed to 4.3 percent in 1997, the economy contracted by 13.1 percent in 1998. GDP in manufacturing also shrank by 11.4 percent in 1998.

As the statistical data by firm size discussed in Chapter 4 indicated, these significant changes in the economic environment tended to negatively affect SMEs in the machinery sector, including our sample firms. During 1996-99, the SME sector in the machinery industry (ISIC 38) decreased its output at 1.4 percent per year. According to JICA (1999), approximately 80 percent of 129 sampled auto parts supplier firms in Indonesia replied that they had experienced negative effects during 1997-98.

However, it is necessary to note that the impact of the economic crisis on SMEs is quite heterogeneous according to factors such as firm size (even within SMEs), sector (even within metalworking and machinery), location and market orientation. For example, within the SME sector in the machinery industry, medium SMEs with 20 to 99 employees were better able to respond to the sudden changes in economic conditions than smaller SMEs with 19 or less employees. During 1996-99, value added of the former SME group expanded at an average annual rate of 12 percent, while that of the latter SME group contracted at a rate of 10 percent. It seems that performance of subcontracting SMEs in the crisis period would significantly depend on whether, in a relative sense, subcontracting linkages during 1997-98 served for LEs as buffers for economic fluctuations or served for SMEs as mechanisms of maintaining long-term relations and stable orders.

Accordingly, this chapter and the following four will carefully consider the consequences of the crisis contained in the data and information obtained from our interview and questionnaire survey. Chapter 7 will be cautious, because it is largely based on quantitative data from SMEs on their production, which appear to be affected by the crisis.[1] However, our study does not intend to focus on the impact of the crisis, but to understand the role of subcontracting linkages in SME development in a longer-term perspective.

5.3 Methods of Firm-level Survey

This study focuses on small-medium metalworking and machinery firms that have supplied their products or processing services to: 1) automobile and motorcycle; 2) agricultural machinery; and 3) bicycle manufacturers. The selection of these subsectors is a consequence of considerations about the divisibility of production processes and the need to compare different levels of quality of products and services required and supplied. The metalworking and machinery industry tends to have many production processes and can easily be divided into several operation stages. In general, automobile and motorcycle assembler firms require products from their supplier firms that are of a higher quality than agricultural machinery and bicycle assembler firms.

From the above subsectors, firms were selected according to three criteria: 1) employment size (less than 300 employees); 2) investment status (mainly domestic investment); and 3) location (Jakarta, Sukabumi, Bandung and Surabaya). As argued in Chapter 4, this study defines SMEs as firms with 299 or less employees. Since joint venture companies have usually received strong support from their headquarters abroad, in addition to assistance from domestic sources, the study aimed to look mainly at Indonesian local firms without such intensive support from overseas. Also, this study needed to cover both urban and rural areas within a limited time. Chapter 4 illustrated that manufacturing in Indonesia has been concentrated in Java, particularly in

[1] Chapter 7 will examine whether and how our quantitative data are atypical owing to the impact of the economic crisis.

Jakarta/West Java and East Java. Such geographical distribution of manufacturing businesses may allow this study to select sample metalworking and machinery firms in the following areas: 1) metropolitan JABOTABEK (greater Jakarta area consisting of the cities Jakarta, Bogor, Tanggerang and Bekasi); 2) the city Bandung (including its surrounding areas); 3) the town of Sukabumi (a town in rural West Java); and 4) the city Surabaya (including its surrounding areas).

The following information sources were used for the selection of our sample firms:

(1) directories such as *Indonesian Machinery Industry Directory* (1998), *Indonesian Manufacturers Directory 1997/1998* (1997) and *Automotive Parts and Components Industry Directory in Indonesia* (1996) of Capricorn Indonesia Consultant;
(2) *Manufacturing Directory Indonesia 1998* (1999) of BPS;
(3) directories issued by industrial associations such as *GIAMM Directory 97* (1997) of the Indonesian Automotive Parts and Components Industries Association and *Metalworks & Machinery Industry Directory 1998-1999* (1997) of the Federation of Associations of Indonesian Metalworks and Machinery Industries (GAMMA);
(4) *Telephone Guide in Jakarta 1999: Industry and Commerce (Yellow Pages)* (1999) of Infomedia Nusantara; and
(5) direct information from industrial associations, assembler firms, higher-tier subcontractors and peer firms in similar lines of business.

Based on such criteria and information sources, 205 firms were identified by the purposive sampling method and these were contacted by telephone and/or facsimile. In response to our request, 97 firms (93 local owned and 4 foreign affiliated) allowed us to visit them and conduct our interview survey. Nonresponse bias does not seem serious in this firm-level survey, because of no clear indications of how nonresponse is related to firm performance and of relatively high response rates to our interview and questionnaire.[2] Most of the remaining 108 firms did not accept our visit. For some of them, the correct contact details were not available or firms had gone bankrupt. Interview surveys of 2 to 3 hours were conducted with the owners (or at least directors) of 96 (93 local owned and 3 foreign affiliated) SMEs.[3] These 96 firms also allowed an inspection of the production facilities. After the interview, our questionnaire was submitted to owners (or directors).

The responses from these 96 SMEs that replied to our interview survey are used in Chapter 6 as the sampled data and information. Chapters 7 and 8 are based on further detailed data and information obtained from our questionnaire survey. The number of sampled SMEs in these two chapters is 60 in Chapter 7 and 73 in Chapter 8. The sample size is explained in each chapter.

In addition to SMEs, interviews were conducted with 15 large-scale assembler firms consisting of six automobile assembler firms (including one large-scale components producer), two motorcycle assembler firms, three agricultural machinery assembler firms, and four bicycle assembler firms.[4] Chapter 9, which examines SMEs and subcontracting linkages from the viewpoint of large-scale parent firms, is based on the responses from the above 15 assembler firms. In parallel, interviews were also conducted in 20 government agencies, industrial associations, financial institutions and other organisations responsible for SME development.

---

[2] For further details on nonresponse bias, see Chapter 7 in this study.

[3] One foreign-affiliated SME refused to respond to our questions after we visited its office.

[4] Our visit to large-scale assembler firms is designed to supplement interviews with SMEs through obtaining from LEs the data and information on subcontracting linkages with SMEs and examining whether responses from SMEs are consistent with those from LEs. As will be observed in the subsequent section, populations of LEs in the selected subsectors are much smaller than those of SMEs. Therefore, the sample size of LEs is small in this study.

5.4 Basic Characteristics of the Sample Firms

What types of SMEs were selected for this study? Table 5.1 presents some of the key features of the 96 sample metalworking and machinery SMEs in the automobile, motorcycle, agricultural machinery and bicycle subsectors in 1998.

The number of SMEs in our sample is distributed almost evenly over the size categories in terms of employment from micro-scale (1-19) to larger-scale (100-299). Around one third of the sample producers are managed by *pribumi* (indigenous Indonesian) entrepreneurs and the remaining two thirds by their non-*pribumi* (mainly ethnic Chinese) counterparts. [5] This proportion may suggest that non-*pribumi* entrepreneurs have played a major role in operations of Indonesian metalworking and machinery SMEs. Nearly three quarters of the firms were located in Jakarta (and surrounding areas), one fifth in Surabaya (including surrounding areas) and the rest in Sukabumi and Bandung (including surrounding areas). This reflects the locational concentration of the automobile, motorcycle, agricultural machinery, and bicycle businesses, which is consistent with the geographical distribution of manufacturing output discussed in Chapter 4.

Two thirds of the sample SMEs were in the automobile and motorcycle subsectors and one third in the agricultural machinery and bicycle subsectors. These proportions of automotive/motorcycle and bicycle firms are close to those of the relative number of SMEs in these two groups reported in BPS's manufacturing statistics in 1998. [6] More than half of the respondents were engaged in machining and press/stamping, 10 percent in casting and forging, another 10 percent in plating, heat

[5] In this study, despite different wordings, expressions saying that "..... firm is *owned, directed, run, managed, etc.* by ....." refer to ethnic affiliation of the ownership of the firm.
[6] The ISIC classification does not allow us to easily extract the number of SMEs producing agricultural machinery parts from BPS data. Therefore, the number of agricultural machinery parts supplier firms cannot be related to that of their automotive and motorcycle counterparts.

treatments, surface treatments, welding and painting, and the remaining in multi-processes covering two or more activities of the above technological areas and sub-assembling of parts/components. Our sampled SMEs tend to specialise in relatively simple materials processing technology.

Approximately half of the firms began operations before 1989 and the remaining firms were established in the 1990s. The latter group started their business in response to the rapid expansion of respective markets. Almost one-third of the owners in the sample had university education, while approximately one-sixth of the surveyed enterprises employed skilled workers (including engineers and technicians) with some higher education. The educational levels of our metalworking and machinery SME entrepreneurs are similar to those of Indonesia's furniture counterparts, where nearly 30 percent of entrepreneurs completed at least some university education (Levy, Berry and Nugent 1999: 23). *Large and Medium Manufacturing Statistics 1996* reported that workers with higher educational levels of diploma (D3) or university accounted for 5 percent of the total workforce in machinery SMEs. Compared to this BPS data, our sample SMEs appear to have workers with relatively high educational attainments. However, the discrepancy between these two sources is due to the use of different kinds of data. The data in this study showed average educational levels only in skilled workers working for SMEs with 299 or less employees located mostly in urban areas, whereas the data from BPS indicated educational levels of both skilled and non-skilled workers for SMEs with 20 to 99 employees located in urban and rural areas.

Table 5.1 Profile of 96 Sample SMEs in 1998

1. *Size: Number of Workers*	
1) 1 - 19	23%
2) 20 - 49	26%
3) 50 - 99	25%
4) 100 - 299	26%
2. *Ethnic Group of Entrepreneurs*	
1) *pribumi*	37%
2) non-*pribumi*	63%
3. *Location*	
1) Jakarta (and surrounding areas)	74%
2) Surabaya (and surrounding areas)	18%
3) Sukabumi	6%
4) Bandung (and surrounding areas)	2%
4. *Subsector*	
1) automotive/motorcycle	67%
2) agricultural machinery	21%
3) bicycle	12%
5. *Major Manufacturing Processes* [1]	
1) multi-processes[2]	24%
2) casting	8%
3) forging	1%
4) machining	33%
5) press/stamping	23%
6) others[3]	11%
6. *Year Established*	
1) - 1979	20%
2) 1980 - 1989	33%
3) 1990 -	47%
7. *Educational Levels of Entrepreneurs*	
1) high school or less (including D3)[4]	65%
2) university	35%
8. *Educational Levels of Skilled Employees (average)*	
1) high school or less	83%
2) university (including D3)[4]	17%

Notes: 1) Major manufacturing processes represent main technological activities or areas that each firm deals with in subcontracting business.
2) Multi-processes indicate two or more technological areas among 2) casting - 6) others and sub-assembling of parts/components.
3) Others include plating, heat treatments, surface treatments, welding and painting.
4) D3 represents polytechnic (or equivalent level) graduates.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Table 5.2 Main Problems of Sample Firms at the Initial Stage and at the Present

Problems	Initial Stage		Present	
	Mean Scores [1] (s.d.)[2]	Rank	Mean Scores [1] (s.d.)[2]	Rank
1. *Market Access*	4.47 (0.60)	1	4.38 (0.59)	2
2. *Input Materials*	3.84 (0.91)	7	3.85 (0.76)	6
3. *Skilled Labour*	4.04 (0.82)	6	3.70 (0.74)	7
4. *Production Technology*	4.30 (0.78)	2	4.25 (0.68)	3
5. *Financial Sources*	4.14 (0.93)	3	4.47 (0.58)	1
6. *Management*	4.05 (0.66)	5	3.93 (0.71)	5
7. *Access to Technical Institutions*	3.14 (0.95)	11	2.73 (1.20)	9
8. *Infrastructure*	3.36 (0.90)	9	2.82 (0.79)	8
9. *Production Capacity*	3.32 (0.60)	10	1.86 (0.63)	11
10. *Expensive Machinery & Equipment*	3.53 (0.73)	8	1.93 (0.61)	10
11. *Competition in Markets*	4.07 (0.82)	4	4.14 (0.65)	4
Number of Sample Firms[3]	73		73	

Notes: 1) Mean scores represent the average of scores indicated by firms' rating from 1 (the lowest score, a very small problem) to 5 (the highest score, a very large problem).
2) Figures in parentheses are standard deviation.
3) The number of sample SMEs is 73, instead of 96, because of data constraints.
Source: Based on author's interview and questionnaire survey during 1999-2000.

As already discussed in Chapter 2, due to reasons such as insufficient internal resources and industrial policies in favour of LEs, SMEs usually encounter specific problems that are different from those of LEs. Our sample SMEs faced similar problems.[7] Table 5.2 shows the main difficulties in operations of sample SMEs both at the initial stage and at the moment of the survey.[8] The numbers in the table are average scores on a five-point Likert-type scale, where "5" represents the highest degree of seriousness and "1" the lowest.

At the initial stage, problems with respect to marketing, technology and financial sources are the most difficult ones, rated by sample SMEs at average scores of 4.5, 4.3 and 4.1, respectively. Despite their easy foundation relative to LEs, SMEs cannot start in the manufacturing business without markets, technologies and capital. In addition to these three, severe competition in markets, insufficient managerial skills and the lack of skilled labour were the substantial problems our sample SMEs had to overcome before launching their manufacturing businesses.

For instance, a small-scale firm (*Firm S16*) in Jakarta was confronted with difficulties in channelling press parts for motorcycles to after-market (spot-basis replacement parts market) at a start-up phase of operations in 1990. *Firm S16* continued to struggle with marketing in unstable and competitive one-off exchanges until the mid-1990s, when it started subcontracting transactions with large-scale automobile and motorcycle assembler firms. When a small and *pribumi* firm (*Firm S17*) prepared for the production of press parts for vehicles in 1995, it was not able to invest in plant and machinery at a desirable level, due to a failure to mobilise start-up capital from formal financial institutions. A founder (not a current president) of *Firm S66* in Surabaya had initial teething troubles in the areas of technology and management, when he left being a salaried worker in car maintenance and started his

[7] Similar to the observation in this chapter, Urata (2000: 87-107), on the basis of a survey covering SMEs, cooperatives and chamber of commerce and industry in five cities in Indonesia, indicated that SMEs faced the following problems: 1) insufficient production technologies and quality control; 2) the lack of market access; 3) limited access to SME finance; 4) insufficient managerial capabilities; and 5) inadequate production equipment.

[8] The number of respondents in this table is not 96 but 73, due to data constraints.

own small-scale business in the production of parts for agricultural machinery in 1980. As a principal engineer and top management, he had to make great efforts to acquire production technology and managerial skills from scratch without sufficient support from outside.

At the time of the survey, financial problems were ranked the highest, with an average score of 4.5. This rating is consistent with the result of Berry and Levy (1999: 65-8), which indicated that the sample of garment and rattan SMEs perceived the high cost of credits as their single greatest obstacle. The lack of information on formal financial sources for investment and working capital and long and complicated application processes for credits have remained unchanged. In addition, the high score given by our sample firms may reflect the unfavourable financial situation as a consequence of the 1997-98 economic crisis. Since the onset of the crisis, credits from banks and other financial institutions became less available (Tambunan 2000: 169, 171-2). For example, a medium-scale supplier firm producing automotive leaf spring (*Firm S12*) was not able to borrow money from its main bank during 1998-99, because the economic crisis decreased the ability of the bank to lend money to clients, particularly SMEs with less credibility. As a consequence, *Firm S12* had much trouble in financing the shortage of working capital.

Market access and market competition were rated at the second and fourth highest, with average scores of 4.4 and 4.1, respectively. Many SMEs have not been familiar with details of domestic and/or foreign markets for their products, because they do not often know how and where to obtain such information. These high scores also imply that markets for the sample metalworking and machinery SMEs contracted during the economic crisis. A small non-*pribumi* automotive parts supplier (*Firm S15*) had attempted to exploit foreign markets in response to the shrinkage of domestic demand in the crisis. This firm, however, failed to realise this attempt because it could not find information on marketing channels to overseas. *Firm S41*, a small-scale *pribumi* firm producing simple press parts for vehicles, has battled with competitors in terms of price, quality and services, due to the limited size of the market and the existence of many similar firms.

Insufficient production and management technologies appear as the third and fifth severest constraints, with average scores of 4.3 and 3.9, respectively. A need to improve technological and managerial capabilities was perceived as one of the most challenging problems among metalworking and machinery SMEs in our sample. *Firm S68* in Surabaya, which supplies valves to a local agricultural machinery manufacturer, sought ways to upgrade current technological levels and enter the business of high-quality automotive parts. This SME also wished to improve its insufficient managerial knowledge especially of accounting and the control of employees in order to run the company in an efficient way. Procurement of raw materials and intermediate inputs was ranked as one of the main problems, which may also be amplified by the adverse effects of the recent crisis, as indicated in Chapter 4. A non-*pribumi* SME (*Firm S04*) has suffered from a sharp rise in the price of imported inputs for automotive mufflers due to the depreciation of the rupiah against US dollar.

Common difficulties are observed in the areas of marketing, technology and finance at the start of operations and at present. Chapter 6 will examine how SMEs have utilised external sources to overcome these key problems.

5.5 Basic Characteristics of the Related Subsectors

This section presents some information on the basic features of the automobile, motorcycle, agricultural machinery and bicycle subsectors in which our sample metalworking and machinery SMEs are operating. The description is mainly based on the qualitative results of our interview survey as well as on BPS data of the manufacturing industry. Table 5.3 summarises the main characteristics of the four subsectors, and Table 5.4 indicates changes in their output.

For analytical purposes, these four subsectors are often aggregated into two groups, 1) automobile and motorcycle and 2) agricultural machinery and bicycle, in the following chapters. This is done for the following reasons: 1) significant overlap between SMEs producing automotive parts and those producing motorcycle parts; 2) different levels of production technologies between automotive/motorcycle parts and agricultural machinery/bicycle parts, where the former generally utilises more intricate technologies than the latter; and 3) insufficient numbers of sample firms, particularly those engaging in the agricultural machinery and bicycle subsectors.

5.5.1 Automobile Subsector

As was the case in several other East Asian developing economies, from the onset of industrialisation in the late 1960s, the Indonesian government had ambitions to establish an automobile industry. This triggered significant and continuous policy intervention by the government (Fujita and Hill 1997). For example, CBU (completely built-up units) imports had basically been prohibited since the early 1970s. The deletion program, which was introduced in 1976 and implemented until 1993, urged players in the automobile subsector to purchase parts and components locally, ranging from paint to tires, batteries, brakes, transmissions and engines for commercial vehicles.[9] An incentive system, which replaced the deletion program in 1993, linked the extent of local content to the levels of import duties for parts and components.

Such measures in favour of domestically manufactured vehicles resulted in an inflow of foreign assembler firms. In the late 1990s, around 20 major foreign-affiliated assembler firms produced their passenger cars and/or commercial vehicles in Indonesia. Roughly half of them were affiliated with Japanese automobile manufacturers such as Mitsubishi, Suzuki, Daihatsu, Toyota and Honda, while the remaining were affiliated with U.S. and European firms such as GM, Ford, Chrysler, Mercedes-Benz, and Volvo. These assembler firms are large-scale enterprises and all located in JABOTABEK.

According to our estimates, 60 to 100 foreign-affiliated first-tier firms are supplying automotive parts and components to the above assembler firms. The firms that entered Indonesia in the 1970s were attracted by the less competitive business environment in which only a limited number of supplier firms engaged in the production of automotive parts and components. The latecomer firms were often required by parent firms to start their businesses in Indonesia. Assembler firms wanted to enjoy benefits of the incentive system or responded to the rapid expansion of the automobile market in the first half of the 1990s. The sizes of foreign-affiliated supplier firms vary, but most of them are located in JABOTABEK. About 100 to 150 local first-tier firms are producing metalworking and machinery parts in the large cities such as Jakarta, Surabaya and Bandung. There are a large number of SMEs that produce auto parts as second- and lower-tier supplier firms or as non-subcontracting firms. Metalworking and machinery SMEs that serve as lower-layer supplier firms tend to

[9] For details of the deletion programs in the machinery industry, see Thee (1994: 109-11).

operate in places not far from their higher-layer customers. On the other hand, SMEs that do not engage in subcontracting business and supply non-OEM (original equipment manufacture) products to after-market (spot-basis replacement parts market) are not only located in Jakarta and Surabaya but also in other urban and even rural areas.

The Indonesian automobile industry is focused on the domestic market, which is limited in size (e.g., around 390,000 units in 1997 as the largest number of sales) and fragmented by many brands and models of vehicles. Since the late 1980s, supplier firms have developed in response to the expansion of the domestic market. As a consequence, localisation of auto parts has accelerated in Indonesia. According to Aswicahyono, Basri and Hill (2000), by 1995, the average local content ratios for passenger cars and light commercial vehicles were 11 and 40 percent, respectively. The difference in these local content ratios may reflect the situation in which the latter group uses simpler production technologies, has a relatively larger market, and attracts a higher degree of government policy support (e.g., the deletion program) than the former.

Table 5.4 indicates that, prior to 1997-98, the output in the automobile industry increased remarkably at an annual average rate of 18 percent. In this period, the automobile subsector occupied roughly one-fifth of output in the machinery industry as a whole. However, the automobile industry suffered considerably from the slump in demand for new cars in 1998. Sample SMEs in this subsector were generally most heavily affected by the recent crisis.

Table 5.3 Basic Characteristics of Related Subsectors

	Automobile	*Motorcycle*	*Agricultural Machinery*	*Bicycle*
Government Intervention & Protection	· strong policy intervention and high protection · deletion program · incentive system (local content programs)	· almost the same as automobile	· some policy intervention and protection · deletion program	· no significant intervention and protection
Assembler Firms	· around 20 major foreign-affiliated firms (Jakarta) · large-scale firms	· 5 major foreign-affiliated firms (Jakarta) · large-scale firms	· around 30-50 firms (Jakarta, Surabaya, etc.) · small- to large-scale firms · several foreign-affiliated, the remaining local	· around 30-50 firms (Jakarta 30%, Surabaya 30%, Medan 15%) · small- to large-scale firms · local, with some Taiwan-affiliations
Supplier Firms	· around 60-100 foreign-affiliated 1st-tier firms (Jakarta) · around 100-150 local 1st-tier firms (Jakarta, Surabaya, Bandung) · many local 2nd-/lower-tier & non-subcontracting firms (Jakarta, Surabaya, other urban/rural areas)	· large overlap with auto parts supplier firms (more firms than automobile, due to simple technology and large market size)	· around 20-30 foreign-affiliated 1st-tier firms (Jakarta, Surabaya) · around 30-50 local 1st-tier firms (Jakarta, Surabaya, other cities) · many lower-tier & non-subcontracting firms (throughout Indonesia)	· around 10-20 foreign-affiliated 1st-tier firms (Jakarta, Surabaya) · around 30-50 local 1st-tier firms (Jakarta, Surabaya, Medan) · many lower-tier & non-subcontracting firms (urban/rural areas in Java and North Sumatra)
Market Structure	· fragmentation in limited local market size · domestic-oriented · after market	· larger domestic market than automobile · gradually outward-looking · large after market	· not large domestic demand size · domestic-oriented · competition with imported low-price Chinese products	· not large domestic demand size · highly export-oriented (low-end) · competition with imported low-price Chinese products
Local Content	· low for passenger cars · high for commercial vehicles	· high · several critical components still imported	· high · several critical components still imported	· high · several critical components still imported
Production Trends	· severely affected by the economic crisis	· affected by the crisis, but not hard-hit relative to automobile	· affected by the crisis, but not hard-hit relative to automobile	· affected by the crisis, but not hard-hit relative to automobile · affected by EU's antidumping sanctions since 1996

Note: Supplier firms are basically limited to those engaged in metalworking and machinery operations.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Table 5.4 Changes in Output of Related Subsectors

	Automobile (38431+32+33)[1)]	*Motorcycle* (38441+42)[1)]	*Agricultural Machinery* (MOIT)[1)]	*Bicycle* (38443+44)[1)]
Gross Output (Rp billion, 1993 prices)[2)]				
1986	1,451.1	778.1	-	40.2
1990	3,890.3	1,507.0	-	100.9
1994	6,152.5	5,486.3	767.2	290.4
1995	7,268.3	6,613.4	1,293.0	438.3
1996	7,509.9	7,695.9	1,719.0	397.6
1997	6,722.8	6,991.4	1,843.8	245.9
1999	3,364.7	6,316.6	-	321.6
Growth of Gross Output (%)[3)]				
1986 - 1996	17.9	25.8	-	25.8
1996 - 1999	-23.5	-6.4	-	-6.8
1986 - 1999	6.7	17.5	-	17.4
1994 - 1996	10.5	18.4	49.7	17.0
Share of Gross Output in Total Machinery Industry (%)[4)]				
1986	20.6	11.0	-	0.6
1994	22.2	19.8	2.8	1.1
1996	16.9	17.3	3.9	0.9
1999	10.0	18.7	-	1.0

Notes: 1) For automobile, motorcycle and bicycle, the numbers in parentheses correspond to ISIC code. Agricultural machinery is exceptionally based on MOIT's internal classification, due to data limitations.

2) Gross output is deflated with the wholesale price index for manufacturing and is demonstrated in 1993 prices.

3) The growth represents annual average growth rates in each period.

4) The share is calculated as the proportion of respective gross output in the machinery industry as a whole.

Sources: Automobile, motorcycle and bicycle are based on BPS, *Large and Medium Manufacturing Statistics*, while agricultural machinery is from MOIT's internal statistical data.

5.5.2 Motorcycle Subsector

The policy environment of Indonesia's motorcycle industry has been almost same as that of the automobile industry. A protective environment emerged in the late 1960s. Subsequent to restrictions on imports of CBU in 1969, a deletion program for the motorcycle subsector was introduced in 1977 to promote the localisation of production of parts and components (Thee 1997: 112). During 1993-99, an incentive system, which gave reductions of import duties according to the degree of local content of final products, replaced the deletion program.

In contrast to its automobile counterpart, there have only been a limited number of firms that actively engaged in assembling operations in the motorcycle industry. They consist of five large-scale players (Yamaha, Suzuki, Honda, Kawasaki, and Piaggio's Vespa), all of which are foreign-affiliated and located in Jakarta (including its surrounding areas).

Supplier firms tend to produce both automotive and motorcycle parts. This suggests a considerable overlap of the parts producers in the two subsectors in Indonesia. However, the number of supplier firms in the motorcycle subsector is larger than that of the automotive subsector, because of the relatively simpler technologies and the larger market size associated with the smaller number of brands and models. These circumstances provide motorcycle parts producers with easier market access opportunities than in the case of automotive parts (Thee 1997: 117).

The production volume of motorcycles (e.g., 1,860,000 units in 1997) exceeded that of four-wheel vehicles by far. Although most production is for the domestic market including significant production for the after-market (the spot-basis market for replacement parts), export production has expanded markedly since the early 1990s.

Reflecting this larger market size along with some effects of the deletion program and incentive system, local content ratios rose significantly from 24 percent in 1979 to nearly 90 percent in 1995 (Thee 1997: 105-6). Except for some critical components, most items for motorcycles were locally produced by the mid-1990s.

Table 5.4 shows that the value of gross output in the motorcycle subsector increased sharply at more than 25 percent per annum during 1986-96. It equalled output in the automobile subsector in 1996. The motorcycle industry was also affected by the recent crisis, but less severely than the automobile industry, in terms of changes in output, because of its substantially lower prices of products and relatively more export-oriented strategy than the automobile subsector.

5.5.3 Agricultural Machinery Subsector

Policy intervention existed in the Indonesian agricultural machinery subsector, similar to the automobile and motorcycle subsectors. In 1977, the Indonesian government selected agricultural machinery as one of the engineering subsectors in the deletion programs and promoted the localisation of parts and components for diesel engines. Supratikno (1998: 82-3) stated that the government provided the agricultural machinery subsector with less policy intervention and support than the automobile and motorcycle subsectors. This was probably due to the smaller size of domestic demand, relative to that of two- and four-wheel vehicles. In addition to this smaller impact on the economy, the agricultural machinery industry does not have a symbolic meaning in the process of industrialisation and economic development, compared with the automobile industry. The subsector did not rank high in terms of political interest.

Some five to seven large-scale foreign-affiliated assembler firms have operated in the agricultural machinery industry. For example, Yanmar, Kubota and Mitsubishi have been involved in this field for a long time. In addition to such foreign-affiliated firms, approximately 30 to 40 local firms were engaged in producing a variety of agricultural machinery such as tillers, tractors, mowers, sprayers, combines, threshers, polishers, dryers, irrigation pumps and diesel engines. These local manufacturers range from small-scale to large-scale firms and are located in various areas in Java. In the early 1990s, low quality but very cheap imported agricultural machinery products from China started to erode local markets. This required Indonesia's assembler and supplier firms to improve their efficiency of production to maintain competitive.

Roughly 20 to 30 foreign-affiliated first-tier firms, most of which are located in Jakarta and Surabaya, have supplied parts and components to large-scale agricultural machinery assembler firms. Since the size of the domestic market is too small to facilitate specialisation in agricultural machinery, many of the foreign-affiliated metalworking and machinery producers seem to serve not only this subsector but also the automobile or motorcycle subsectors. According to our survey, about 30 to 50 local firms act as first-tier supplier firms in the agricultural machinery field. Reflecting the prevalence of agriculture activities throughout the country, there are a large number of small-scale parts producers that do not supply high quality products to assembler or higher-tier firms but sell low quality and non-OEM products to the after-market on a spot basis.

Relatively simpler production technologies and the implementation of a deletion program have promoted localisation of parts and components production for agricultural machinery and equipment since the late 1970s. According to a large-scale local assembler firm in Surabaya, it raised its local content ratio of power tillers (excluding diesel engines) from around 50-60 percent in the mid-1980s to nearly 100 percent in the mid-1990s, and that of diesel engines for tillers produced by its sister company has recently reached nearly 50 percent. Similarly, in the case of tillers, a Japanese-affiliated agricultural machinery manufacturer noted that it recorded around 80 percent of local content ratio, while its sister company specialising in diesel engines achieved 60-70 percent.

Based on the limited information in Table 5.4, gross output of the agricultural machinery and equipment industry was roughly a quarter of that of the automobile or motorcycle industries just before 1997-98. Despite such a smaller share, production expanded rapidly in the mid-1990s in response to an increase in farm income during the high growth period of the economy. It seems that agricultural machinery has not been affected very seriously by the current crisis, because the products of this subsector are not luxuries but necessities and the agricultural sector suffered far less from the 1997-98 economic setback than the other sectors.

5.5.4 Bicycle Subsector

The Indonesian government has not paid much attention to the bicycle industry. Although the bicycle subsector was, from the late 1970s, included as one of the other engineering goods subsectors in the deletion programs, there is no evidence that the government introduced any explicit policy measures to promote the localisation of parts and components of bicycles. Its smaller share in total machinery output (see Table 5.4) may have reduced political and policy interests. In contrast to the associations for automobile and motorcycle industries, the Association of Indonesian Bicycle Industry

(AIPI) seems institutionally weak and may not have been able to influence political and policy circles through lobbying activities in any significant manner.[10]

Our field survey suggests that 30 to 50 firms engage in assembling bicycles (including tricycles mainly for children). Bicycles have been manufactured by various types of assembler firms. Since bicycles can generally be produced with low capital intensity and with simple technologies, small-medium enterprises located in areas other than Jakarta and Surabaya (e.g., Medan) participate in assembling operations. Many of these assembler firms are run by non-*pribumi* entrepreneurs and tend to have relationships with companies in Taiwan, the world's centre for bicycle production. These relations range from joint ventures to licensing contracts and technical assistance agreements.

Some 10 to 20 foreign-affiliated first-tier supplier firms, mostly located in Jakarta or Surabaya, are producing bicycle parts and components. They sometimes overlap with producers which supply products to motorcycle assembler firms. Under the bicycle assembler firms, roughly 30 to 50 local companies serve as first-layer vendor firms. A huge number of micro-, cottage- or small-scale and non-subcontracting producers are linked to after-market production of low-quality and no brand parts. They are scattered throughout Java and North Sumatra, where the market size of bicycles is large and the base of the machinery industry is strong relative to other areas in Indonesia.

In order to cope with relatively small domestic demand, Indonesian bicycle assembler firms have developed an export promotion strategy which aims at the low

[10] In general, industrial associations in Indonesia do not have the professionalism and accountability to gain the confidence of member and/or potential companies in the respective sectors (Berry and Levy 1999: 70).

end of foreign markets, in particular the EU.[11] Table 5.4 indicates that bicycle production increased significantly up to 1995, in part due to an increase of exports to Europe. However, output value decreased visibly in 1996 and 1997, because the EU took antidumping sanctions against Indonesian bicycle exporters in 1996. Major Indonesian bicycle manufacturers stopped exports to the EU after surcharges of 22 to 26 percent were imposed. In 1997-98, the economic turmoil amplified this setback. The bicycle industry has recently attempted to overcome this hindrance, by expanding exports to other markets such as the U.S., Canada, Australia and Latin America.

[11] Indonesia can find advantages in the bicycle industry that uses simpler and relatively labour-intensive technologies. This seems to be the main reason why it was able to drive bicycle exports to Europe in the first half of the 1990s. The features of technologies adopted in the automobile industry are clearly different from those of the bicycle industry.

Chapter 6

Support Mechanisms for SME Development in Indonesia: Qualitative Evidence from SMEs

6.1 Introduction

As described in Chapter 2, the potential advantages of SMEs in developing countries include: 1) significant proportion in economies; 2) favourable combination and utilisation of production factors; 3) foundations for industrialisation; 4) export promotion; 5) more equal distribution of income; and 6) flexibility to changing economic conditions. However, at the same time, SMEs tend to suffer from common problems that limit their potentially positive roles in economies. As discussed in Chapters 2 and 5, insufficient entrepreneurial and financial capabilities are typical internal constraints to SME growth, while inadequate access to technologies, markets and credits and government policies in favour of LEs are common external constraints.[1] It is difficult for SMEs with limited human and financial resources to acquire technology, develop markets and arrange financing by themselves. SMEs cannot rely

[1] Thee (1994) summarised Indonesian SME policies and their effects on the development of SMEs. He argued that government policies did not necessarily enable Indonesian SMEs to develop technology, have better access to credits and create inter-firm linkages.

on their internal resources to the same extent as LEs (Berry, Rodriguez and Sandee 2001: 363). Given such internal constraints, how can SMEs develop in LDCs?

This chapter looks at the external sources available to SMEs. It examines how they work as support mechanisms for the development of SMEs, using the case study of metalworking and machinery industry in the automobile, motorcycle, agricultural machinery and bicycle subsectors in Indonesia. This corresponds to Question 3 raised as one of the seven research questions in Chapter 2.

There are similar studies on support mechanisms for SMEs. Kojima and Okada (1997) examined how technology-supporting institutions and government policies improved technological capabilities of SMEs in the Japanese casting industry.[2] Levy *et al.* (1999) documented the roles of the private and government sectors in support systems for export-oriented SMEs, covering a wide range of subsectors such as garments, leather products, furniture, silverware, machinery and automotive components in Indonesia, Colombia, Korea and Japan. Marsden (1984) discussed problems SMEs in Thailand have encountered in their business and sources of assistance they have obtained to cope with such difficulties, focusing on the metal-processing industry.

This chapter addresses the following specific questions.

(1) What kind of external support mechanisms have SMEs used to improve their capabilities?

(2) How effective have such external sources been for SMEs in developing their capabilities?

[2] Technology-supporting institutions include national research institutes, prefectural research institutes, inter-firm networks, industrial associations, industrial cooperatives, consulting firms and universities (Kojima and Okada 1997: 1).

To clarify how or from which sources SMEs have obtained the relevant technological, marketing and financial capabilities necessary for corporate management would also suggest what kind of future policies or strategies Indonesia should prepare and adopt to support SMEs which can potentially stimulate industrialisation and economic development. Major external sources for supporting SMEs are broadly classified into the following three channels: 1) the private sector (e.g., assembler or parent firms, peer firms in similar business, supplier firms for machinery and equipment, supplier firms for input materials, and banks and financial institutions); 2) non-public collective institutions (e.g., industrial associations, chambers of commerce and industry, cooperatives, NGOs); and 3) the government or quasi-government sector (e.g., government ministries/agencies and public technical institutions).

As noted in Chapter 5, this study focuses on small-medium metalworking and machinery firms that have supplied their products or processing services to automobile, motorcycle, agricultural machinery and bicycle manufacturers. After sample firms were identified, we conducted interview surveys with the owners (or at least directors) of 96 (93 local owned and 3 foreign affiliated) SMEs. Table 5.1 in the previous chapter presented some of the key characteristics of the sample metalworking and machinery SMEs in the automobile, motorcycle, agricultural machinery and bicycle subsectors in 1998.

After this introduction, Section 6.2 examines external sources of technical support to the sample metalworking and machinery SMEs. Section 6.3 looks into channels of marketing support for the sample SMEs and Section 6.4 investigates financial sources for their business operations and investment. Finally, Section 6.5 presents the main findings in this chapter and some remarks about support mechanisms for the development of SMEs in Indonesia.

6.2 Support Mechanisms of Technology Acquisition for SMEs

Due to the lack of internal resources, SMEs in general have to use various kinds of external resources in order to learn technology and improve production efficiency.[3] Table 6.1 shows several external sources of technical support available to metalworking and machinery SMEs in Indonesia.

Nearly 80 percent of the 96 sample SMEs acquired technologies from parent firms through subcontracting transactions.[4] The statistical tests in Table 6.1 indicate that difference in the share of SMEs with technical support from parent firms is significant at the 1 percent level between firm groups in subsector categories. SMEs in the automobile and motorcycle subsectors had more frequent technological linkages with large-scale parent firms than those in the agricultural machinery and bicycle subsectors. This clearly reflects the differences in size and technological capabilities between the automobile and motorcycle assembler firms and the agricultural machinery and bicycle counterparts. Based on our observations in the interview survey of parent firms, the former groups generally operate on a larger scale of production and have substantially higher technological levels than the latter groups.[5]

[3] The meaning of technology varies largely according to the way it is defined. For example, Thee (1997: 126-31) focused on innovative technology in his study of the motorcycle industry in Indonesia. Our study, however, considers technology broadly as factors which can improve production efficiency. Therefore, technology includes not only purely technical matters but also production management skills such as quality control and delivery time control. Similarly, it encompasses not only innovative and new technologies but also adaptive and even basic operational technologies.
[4] Parent or principal firms here include assembler firms and higher-tier supplier firms which contract out to sample SMEs through subcontracting transactions.
[5] See Chapter 9, which examines the different features of the parent firms in these two groups.

Table 6.1 Channels and Effectiveness of Technology Support Mechanisms for SMEs

Channels	User Firms (N = 96) No. of Firms 1) (%)	Rank	Differences in No. of User Firms between Groups in Categories: Size 2) p-values	Ethnicity 3) p-values	Subsector 4) p-values	Mean Scores of Usefulness: Mean 5) (s.d.)	Rank	Differences in Mean Scores between Groups in Categories: Size 6) F-values	Ethnicity 7) t-values	Subsector 8) t-values
1. *Parent Firms*	75 (78.1)	2	0.55	0.62	0.00 ** (-)	3.48 (1.25)	1	5.72 ** (-)	3.28 ** (-)	1.68
2. *Firms in Similar Business*	62 (64.6)	3	0.00 ** (+)	0.02 * (+)	0.66	3.31 (1.05)	3	1.20	0.03	0.31
3. *Equipment Suppliers*	79 (82.3)	1	0.81	0.79	0.40	2.89 (1.28)	5	1.34	0.62	1.59
4. *Input Suppliers*	5 (5.2)	10	0.89	0.65	1.00	3.00 (0.71)	4			
5. *Foreign Sources*	16 (16.7)	8	0.01 ** (-)	0.16	0.25	3.44 (0.89)	2	0.44	0.94	0.94
6. *Associations*	19 (19.8)	7	0.26	0.19	0.11	2.58 (0.90)	8	0.98	2.18 * (-)	1.23
7. *Public Technical Institutions*	30 (31.3)	5	0.17	0.11	0.49	2.67 (1.24)	6	2.01	2.57 * (+)	0.11
8. *Universities*	22 (22.9)	6	0.02 * (+)	0.00 ** (+)	0.44	2.27 (1.16)	9	0.11	0.74	0.20
9. *Technical Literature*	38 (39.6)	4	0.98	0.20	0.66	2.63 (1.22)	7	1.48	1.17	1.51
10. *Other*	13 (13.5)	9	0.32	0.55	1.00	2.00 (0.82)	10			

Notes: 1) Figures in the upper row indicate the number of firms which utilise each channel. Figures in parentheses are the share of firms with each channel in the total sample firms.

2) Differences in frequency ratios between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by *p*-values of Pearson's chi-square test. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

3) Difference in frequency ratios between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by *p*-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

4) Difference in frequency ratios between firms engaged in the automobile/motorcycle subsectors (AM) and the agricultural machinery/bicycle subsectors (AB), which is indicated by *p*-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

5) Figures in the upper row are the average of scores indicated by firms' rating from 1 (the lowest score as not at all effective) to 5 (the highest score as very effective). Figures in parentheses are standard deviation.

6) Differences in mean scores of usefulness between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by *F*-values of ANOVA. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

7) Difference in mean scores of usefulness between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by the *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

8) Difference in mean scores of usefulness between firms engaged in the automobile/motorcycle subsectors (AM) and the agricultural machinery and bicycle subsectors (AB), which is indicated by the *t*-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

Source: Based on author's interview and questionnaire survey during 1999-2000.

This technical support from parent firms was ranked the highest in the listed channels, averaging 3.48 on a scale of 1 (the lowest as ineffective or not useful) to 5 (the highest as effective or useful), although the evaluation varied widely according to firm categories of size and ethnic affiliation. Larger SMEs and non-*pribumi* entrepreneurs have been more effective in utilising subcontracting linkages as a tool for developing technological capabilities than their counterparts. In general, smaller and *pribumi* SMEs are often second- or third-layer subcontracting firms. They, therefore, have direct relationships not with assembler firms but with higher-layer supplier firms who cannot necessarily offer reliable technical guidance. In addition, smaller firms are sometimes not able to learn and take advantage of technical hints or suggestions that their parent firms have provided, because of their limited capacity to absorb. For example, *Firm S05*, a first-tier larger SME in Jakarta, provided technical support through subcontracting linkages to *Firm S35*, a second-tier supplier firm with only 10 workers. The latter gave a low score to technical assistance from the former. However, this low-rated evaluation seemed to reflect the limited capability of *Firm S35* to understand and make use of technical advice from *Firm S05*, rather than the quality of technical support itself. Different from *Firm S35*, *Firm S32*, an auto parts supplier firm with 60 workers, perceived similar assistance from *Firm S05* as a major and useful source of technical information.

Our sample SMEs highly appreciated, on average, subcontracting linkages with large-scale parent firms as a channel of technology transfer. However, *Firm S39*, an automotive spring producer in Surabaya, noted that assembler firms in Indonesia, even large-scale or foreign-affiliated ones, do not necessarily have sufficient expertise in every technological field. Therefore, it is necessary to recognise that technical support from parent firms is, in some cases, very limited in Indonesia.

One of the typical technological linkages under subcontracting transactions is, according to many SMEs in our sample, the so-called QC audit, through which their quality management and production management are periodically assessed at the factory by experts dispatched from assembler firms. They give supplier firms recommendations on how to improve the quality and delivery time of the products.[6] More than one third of the sample SMEs have taken part in training programs or lectures on a variety of topics offered by parent firms such as dies-making, quality control, production management, ISO (international standard developed by the International Organization for Standardization) and the JIT (just-in-time) system.

In addition to such classroom-type training programs, a quarter of the sample firms have received practical technical guidance at their factories from experts sent by principal firms. Highly appreciated by some respondents is the plant-tour-type training program. It is designed to let supplier firms pay a mutual visit in a group consisting of five local and five foreign-affiliated supplier firms, and to let them exchange ideas on how to improve the production systems, under the supervision of *Firm A08*, one of the foreign-affiliated motorcycle assembler firms in Indonesia.

When new models were introduced, many of the sample supplier firms received intensive technical guidance on how to produce new parts and components. Such technical support has often been extended to supplier firms through cooperation groups organised by assembler firms. One of the typical and famous groups is the Toyota Manufacturers Club, which was founded in 1987 and has been open to vendors of PT Toyota Astra Motor (TAM). There are 89 member firms as of August 1999. Its main objective is to promote mutual benefits for members (supplier firms) and TAM by improving their technological capabilities through several activities such as providing

[6] Sato (1998b) illustrates the processes of transfer of QC (Quality Control) and TQC (Total Quality Control) activities from Toyota (Japan) to core Japanese-affiliated joint venture companies of the Astra group and other locally owned companies in the group.

education and training, organising QC competitions among member firms, hosting seminars and conferences, planning plant tours and so on.

In addition to assembler firms, some large-scale and first-layer supplier firms (including both local and foreign-affiliated) have recently emerged as an important source of technical support. For example, after the acquisition of QS-9000 (international quality system required by the International Automotive Sector Group) in 1999 with the assistance of a foreign-affiliated automaker (*Firm A18*), *Firm S20*, a local and first-tier supplier firm producing automotive parts and components, began to give lectures on QCD (quality, cost and delivery time) to around 15 second-layer subcontractors.

In our survey, two other inter-firm mechanisms for technology acquisition have proved useful. Assistance from similar firms and support from machinery and equipment supplier firms were both cited as sources of technology by around 65 percent and 82 percent of the respondents, respectively. For example, *Firm S16*, a small-scale and *pribumi* producer, is located in the small industries estate in Pulogadung, Jakarta (PIK Pulogadung) and supplies press parts to motorcycle manufacturers. The agglomeration allowed *Firm S16* to share technical information on metal processing with neighbouring SMEs under a collaborative environment. The owner of a small and *pribumi* firm (*Firm S17*) producing press parts for vehicles has absorbed knowledge on metalworking technology through exchange of technical information with some colleagues who previously worked at the same automobile assembler firm (*Firm A02*) and have currently managed small-scale machinery firms.

Firm S67, a non-*pribumi* firm producing casting parts for agricultural machinery, expanded production facilities in recent years. This investment has given the foundry an opportunity to have a close relationship with firms that supplied machinery and equipment and to continuously receive technical advice on production technologies and operation skills from them. Also, a medium-scale firm (*Firm S37*) engaging in coating and painting for automotive parts and a small-scale firm (*Firm S75*) dealing with electroplating for agricultural machinery parts have both acquired technical information from equipment supplier firms, because these types of technologies can rarely be obtained from other sources including assembler firms in Indonesia.

Differences in the share of establishments with technical support from peer firms are statistically significant between groups of firms according to size and ethnic affiliation. Smaller SMEs and *pribumi* entrepreneurs have relied more on this channel than larger SMEs and non-*pribumi* owners. Compared to the latter SME groups, the former have only restricted access to other technology sources in the private sector. Also, since economically weaker groups are usually afraid of being dominated and exploited by others, they tend to prefer collaboration partners that have equal economic power (Berry 1997: 13). These factors may induce smaller and *pribumi* SMEs to utilise horizontal inter-firm linkages as a channel for learning technologies more frequently than their counterparts. Technical support from peer firms was ranked high with an average score of 3.31, while that from machinery and equipment supplier firms was more moderate with an average rating of 2.89.

Inter-firm technical cooperation with supplier firms of raw materials and intermediate inputs was rare among our respondents. Foreign sources, which mainly include technology licensors in and technical experts (advisors) from foreign countries, were highly appreciated as a channel of learning technologies, with an average rating of 3.44. Many SMEs in our sample expressed their interest in contracting technical assistance agreements with foreign licensors and employing foreign expatriates.

However, these foreign sources are limited to larger SMEs that have sufficient financial resources and information on these matters.

Technical institutions in the public sector were referred to as a source of technological knowledge by around 31 percent of the sample SMEs. Universities were cited as a channel of technical support by approximately 23 percent of the respondent firms. Technical assistance from public technical centres was not highly appreciated on average with a score of 2.67, while support from universities was ranked the second lowest with an average score of 2.27. A non-*pribumi* and relatively larger auto parts producer in Jakarta (*Firm S05*) stated that public technical institutions are often bureaucratic and do not have technologies satisfying needs from the private sector. Relative to larger and non-*pribumi* SMEs, smaller and *pribumi* firms have frequently or effectively utilised technical ties with public institutions or universities. The former SME groups generally have several other channels to acquire technology, while the latter groups do not have many choices. Also, because of the government or public management, these channels provide economically weak or less-developed groups with better access to technologies.

Larger and non-*pribumi* SMEs in JABOTABEK have used public technical institutions such as Serpong research institutes, SUCOFINDO and the University of Indonesia, which are equipped with sufficient facilities.[7] On the other hand, UPTs (technical service units) and local universities, which are public institutions with very limited facilities and budgets, have also been identified as sources of technical

[7] At Serpong in Southwestern Jakarta, more than 10 advanced research institutes have been established under the coordination of the National Center for Science and Technology Development (Puspiptek). Some of these laboratories at Serpong cover modern technologies in the areas of metalworking and machinery. PT SUCOFINDO, a state owned enterprise (BUMN), provides parts and components producers with various kinds of technical and managerial services such as material testing, mechanical testing, chemical analysis, products inspection and QC management training. SUCOFINDO also lends money to small-scale enterprises under the special financial scheme. The University of Indonesia (Faculty of Technology) can give manufacturers technical advice, testing services and research opportunities in the metallurgy and mechanical fields.

information by smaller and *pribumi* SMEs in rural areas.[8] For instance, despite its insufficient human and physical resources, UPT in Sukabumi has played a role in disseminating technical information to smaller *pribumi* SMEs by hosting seminars and introducing technical experts from Jakarta or foreign countries. In this sense, it functioned as a local information centre. However, due to its severe resource constraints for a long time, UPT Sukabumi could not meet the high demand from local SMEs for the testing of materials and products, training on basic technology and day-to-day technical guidance or consultation with industries.

Industrial associations, chambers of commerce and industry, and cooperatives, as collective channels, were cited by less than one fifth of the sample SME producers and rated at 2.58 on average. Apparently, technical support from these channels was not often used and not highly appreciated. Larger SMEs have used nation-wide associations such as GIAMM (Indonesian Automotive Parts and Components Industries Association) and APLINDO (Association of Indonesian Metal Foundry), whereas smaller SMEs have utilised local- or grass-roots-level organisations such as APIKS (Association of Small-scale Metalworking Industries in Sukabumi) and PT Usbersa Mitra Logam.[9] Very few sample SMEs perceived KADIN (the Indonesian Chamber of Commerce and Industry) and KADINDA (the Regional Chambers of Commerce and Industry) as sources of technical information. This may be a consequence of the fact that these organisations do not have any effective channels and institutional devices for collecting needs from local industries and disseminating national policies to them.[10]

[8] Concerning the basic features of UPTs, see Chapter 4.

[9] PT Usbersa Mitra Logam (UML, originally Usaha Bersama Kelompok Logam) was founded in 1992 at SUIK Pulogadung (industrial facilities for small-scale industries in Pulogadung), with assistance from Yayasan Dharma Bhakti Astra (Astra Foundation). This private group, which consists of 10 small-scale metalworking and machinery firms in SUIK, aims to function as an industrial cooperative through collective activities. UML intends to jointly acquire technology and enhance access to market and financing sources. For further details, see Sato (1998a: 137-40).

[10] For instance, the local chambers of commerce and industry in Japan usually have permanent experts specialising in instructing corporate and technology management. The experts also function well in

Information from technical literature was cited by nearly 40 percent of the sample SMEs, but with an average rating of 2.63. Other sources, which mainly include support from NGOs, were utilised by a limited number of SMEs and considered ineffective channels.[11]

The results of our interview survey indicate that linkages in the private sector through principal firms under subcontracting transactions, peer firms in similar business activities and supplier firms for machinery and equipment have been the main and most useful channels of technology acquisition for SMEs. In particular, vertical inter-firm relationships with parent firms were noted as being extremely effective in improving technological capabilities of small-medium metalworking and machinery firms.

This observation seems different from the prevailing ideas that subcontracting linkages have been very weak and limited in Indonesia and that parent firms have not been able to extend effective technical support to their supplier firms (e.g., Goeltom 1997: 170-1; Hill 1997: 214-5; Thee 1985). Our findings reveal that inter-firm relationships through subcontracting linkages in Indonesia have started to create opportunities for SMEs to upgrade technological capabilities, although access to and the effectiveness of these linkages differ between groups of firms according to size, ethnic affiliation and subsector. On the other hand, public and collective channels such as public technical institutions and industrial associations are clearly less useful than private channels.

There are some contrasts between the sources of technical support of smaller and larger SMEs, of *pribumi* and non-*pribumi* SMEs, or of SMEs in the automobile and

giving MITI's new policies and programs to and receiving needs from small-medium firms in local areas. In the case of Indonesia, there is no such intermediate device under KADINDA with limited human and financial resources.

[11] Sato (2000a) reports that technical assistance extended by NGOs (private institutions such as the Astra Foundation) was evaluated as the most effective way by her sample SMEs in Ceper, a rural metal-casting cluster in Central Java. The difference may be a consequence of the different characteristics of the sample firms in Sato and this study, for example, regarding the level of product quality required, type of customers, and access to or relationships with other sources of technical support.

motorcycle subsectors and those in the agricultural machinery and bicycle subsectors. Such differences indicate that approaches to the acquisition of technologies vary according to firm size, ethnic affiliation and subsector. Smaller and *pribumi* SMEs have collaborated on the learning of technology with firms in similar lines of business more frequently than their counterparts. Also, compared to the latter groups, the former groups tend to take advantage of services provided by public technical institutions and universities in order to obtain technical information. In contrast, larger SMEs, non-*pribumi* owners, and firms in the automobile and motorcycle subsectors have had better access to technical assistance from parent firms and have used it more effectively, compared with their counterpart SMEs.

6.3 Support Mechanisms of Marketing for SMEs

Table 6.2 shows the key channels and effectiveness of marketing support for metalworking and machinery SMEs in the automobile, motorcycle, agricultural machinery and bicycle subsectors. Marketing support here means the provision of market information, intermediary functions or markets for products.

Among the private sources, subcontracting relationships were the most dominant marketing channel. Nearly 100 percent of the sample SMEs have linked their products to markets through subcontracting transactions, which were rated at the highest average score of 3.76 in the listed marketing channels. This would be a consequence of the following characteristics of the subsectors: the necessity to ensure a considerable number of high quality parts through assembler-supplier networks (e.g., Odaka, Ono and Adachi 1988: v); and the dominance of subcontracting-oriented Japanese assembler firms in the Indonesian machinery industry.

However, the evaluation of the effectiveness of marketing channels through subcontracting ties varies remarkably between groups of firms according to categories of size, ethnicity and subsector. Statistical tests show that larger SMEs, non-*pribumi* owners and producers in the automobile and motorcycle subsectors appreciated the market function of subcontracting business more highly than smaller SMEs, *pribumi* owners and producers in the agricultural machinery and bicycle subsectors. Since larger firms are likely to have more advanced skills and technologies with modern production facilities, they tend to attract orders from parent firms. Because of strong inter-personal connections in the ethnic Chinese society, non-*pribumi* supplier firms may easily have good business relations with non-*pribumi* parent firms and secure larger or stable orders through subcontracting transactions. Also, differences in the size of the market between the automobile and motorcycle subsectors and the agricultural machinery and bicycle subsectors are attributed to differences in the evaluation of marketing support through subcontracting linkages between SMEs in these two subsector groups.[12]

Support from peer firms in similar business fields has also been important in developing markets. Approximately 80 percent of the sample SMEs cited information from similar firms as a marketing channel and ranked it high, with an average score of 3.38. For example, *Firm S52* and *Firm S55*, both of which are smaller and *pribumi* firms located in Sukabumi, have from time to time shared orders from the spot-basis press parts market between them, according to their work volume. Horizontal networks among *pribumi* SMEs have functioned to a certain extent in this marketing support

[12] According to BPS's *Large and Medium Manufacturing Statistics 1997*, gross output of the automobile and motorcycle subsectors in 1997 amounted to 18,103 billion rupiah, while that of the agricultural machinery (including diesel engine) and bicycle subsectors was 764 billion rupiah. This significant difference in the scale of output suggests that SMEs in the former subsectors were in a better position to enjoy large and/or stable orders from subcontracting ties than the latter.

area.[13] A larger and non-*pribumi* parts producer (*Firm S79*) in Bandung has also developed many clients, taking advantage of the close networks in the ethnic Chinese community in Indonesia. Statistical results indicate that there were no significant differences in the utilisation and evaluation of marketing support from peer firms between smaller and larger SMEs, between *pribumi* and non-*pribumi* firms, and between SMEs producing automobile and motorcycle parts and those supplying agricultural machinery and bicycle parts.

As another private channel, traders or trading houses have a modest role in finding and developing markets. Around half of the respondent SMEs have utilised these trader channels for marketing and gave them an average score of 2.82. The role of traders may be less important than that of the above channels, due to the special patterns of trading in the machinery industry, particularly the automobile and motorcycle subsectors. The OEM (original equipment manufacture) parts tend to be supplied in the subcontracting chain without trading agents. However, traders or trading houses can play an active role in channelling non-OEM products to the after-market (spot-basis replacement parts market). In fact, *Firm S34*, a larger SME producing press parts for vehicles and motorcycles, reported the frequent use of traders for selling its no-brand products to the replacement market.

[13] Since markets for the subsectors in this study are mainly domestic-oriented, *pribumi* networks can function in linking products to markets. However, if export-oriented products are selected, *pribumi* and non-*pribumi* networks work very differently. For export marketing, international connections established by ethnic Chinese business people seem much more effective (Berry and Levy 1999: 43).

Table 6.2 Channels and Effectiveness of Marketing Support Mechanisms for SMEs

Channels	*User Firms (N = 96)*		*Differences in No. of User Firms between Groups in Categories*			*Mean Scores of Usefulness*		*Differences in Mean Scores between Groups in Categories*		
	No. of Firms [1)] (%)	*Rank*	*Size* [2)] p-values	*Ethnicity* [3)] p-values	*Subsector* [4)] p-values	*Mean* [5)] (s.d.)	*Rank*	*Size* [6)] F-values	*Ethnicity* [7)] t-values	*Subsector* [8)] t-values
1. *Parent Firms*	95 (99.0)	1	0.41	1.00	1.00	3.76 (1.18)	1	2.78 * (-)	3.04 ** (-)	3.42 ** (-)
2. *Firms in Similar Business*	77 (80.2)	2	0.54	0.12	0.17	3.38 (1.08)	2	0.99	1.31	1.59
3. *Traders*	49 (51.0)	3	0.76	0.67	1.00	2.82 (1.11)	4	0.92	0.50	0.02
4. *Input Suppliers*	2 (2.1)	7	0.54	0.14	1.00	2.00 (1.41)	6			
5. *Associations*	27 (28.1)	4	0.12	0.48	0.03 * (-)	2.85 (0.82)	3	1.09	0.10	0.93
6. *Government*	25 (26.0)	5	0.11	0.10	0.80	2.24 (0.83)	5	1.48	1.55	1.26
7. *Other*	8 (8.3)	6	0.49	0.00 ** (+)	0.43	2.00 (0.93)	6			

Notes: 1) Figures in the upper row indicate the number of firms which utilise each channel. Figures in parentheses are the share of firms with each channel in the total sample firms.

2) Differences in frequency ratios between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by p-values of Pearson's chi-square test. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

3) Difference in frequency ratios between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by p-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

4) Difference in frequency ratios between firms engaged in the automobile/motorcycle subsectors (AM) and the agricultural machinery/bicycle subsectors (AB), which is indicated by p-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

5) Figures in the upper row are the average of scores indicated by firms' rating from 1 (the lowest score as not at all effective) to 5 (the highest score as very effective). Figures in parentheses are standard deviation.

6) Differences in mean scores of usefulness between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by F-values of ANOVA. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

7) Difference in mean scores of usefulness between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by the t-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

8) Difference in mean scores of usefulness between firms engaged in the automobile/motorcycle subsectors (AM) and the agricultural machinery and bicycle subsectors (AB), which is indicated by the t-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Industrial associations, chambers of commerce and industry, and cooperatives, as collective sources of support, have played a modest role in promoting marketing. Nearly 30 percent of the sample firms have used marketing services provided by these organisations and assigned them an average score of 2.85. Smaller SMEs have taken advantage of marketing information and joint marketing functions provided by local or grass-roots organisations such as the aforementioned APIKS in Sukabumi and PT Usbersa Mitra Logam in Jakarta. Larger SMEs have obtained information on new business opportunities, by taking part in exhibitions organised by national-level associations such as GIAMM and APLINDO. Since GIAMM is relatively well managed in Indonesia, SMEs in the automobile and motorcycle subsectors can have better access to these collective sources, compared to those in the agricultural machinery and bicycle subsectors.

The government sector also assisted SMEs in linking their products to markets, by organising exhibitions and trade fairs. A quarter of the sample firms used the government channels and gave them a low score of 2.24. A non-*pribumi* auto parts supplier firm in Jakarta (*S04*) pointed out that exhibitions organised by nation-wide associations often attract a larger number of potential customers, relative to those organised by government agencies such as NAFED (National Agency for Export Development of the Indonesian Ministry of Industry and Trade). This is probably because the former is more business-oriented and has better information on potential buyers, compared to the latter. Other sources include marketing channels through NGOs, which have extended their assistance to *pribumi* SMEs.[14]

Private channels have played a significant role in establishing market linkages for SMEs. In particular, subcontracting relationships are the most helpful and

[14] In Indonesia, NGOs tend to limit beneficiaries of their SME support to *pribumi* firms which are perceived as an economically weaker group.

influential channels among the various forms of marketing support available to the metalworking and machinery SMEs in our sample. Public and collective sources have, in contrast, provided limited marketing support, although some types of support are useful to a certain extent. Examples are joint marketing and information dissemination dealt with by local- or grass-roots-level associations, and exhibitions and trade fairs organised by national associations and central government agencies.

6.4 Support Mechanisms of Financing for SMEs

As already observed in Chapter 5, access to capital is one of the largest constraints which SMEs face in initiating their business and expanding their production capacity. Insufficient information on formal financial sources for investment and working capital and long and complicated processes for credits have been a major obstacle for the development of SMEs. Table 6.3 shows the key sources metalworking and machinery SMEs in our sample have used to finance their business and how they evaluated such financing sources.

In contrast to technological and marketing support, subcontracting linkages were of minor significance in providing financial assistance to small-medium supplier firms. Nearly 40 percent of the sample SMEs received financial support from principal firms, but they assigned it the second lowest average score of 2.16. Financial assistance from parent firms has been limited mostly to the setting of better payment conditions (e.g., down payment, frequent instalments and quick payment after delivery) and the provision of raw materials, dies or molds. This support tends to be directed to smaller SMEs rather than their larger counterparts. It is not easy for many smaller SMEs to purchase input materials and produce parts and components, if they do not have such financial support. *Firm A01*, one of the major automobile assembler firms in Indonesia, assisted in the establishment of some supplier firms through equity participation.[15] The same assembler firm gave a guarantee for bank loans to *Firm S42*, one of its main supplier firms. These supplier firms, of course, gave the highest score of 5 to such financial support from their parent firms. These cases were, however, exceptional. Subcontracting linkages have not generally worked well in providing SMEs with sufficient financial support. Another inter-firm channel through input supplier firms also did not provide SMEs with sufficient financial arrangements.

There are some possible reasons why subcontracting linkages are not effective in providing financial support for small-medium producers. Several assembler firms noted in our interview survey that, since capital is not necessarily an abundant production factor even for large-scale parent firms in Indonesia, they cannot easily use such a limited resource to support supplier SMEs. Underdeveloped legal systems concerning business and contracting in Indonesia have also prevented principal firms from providing SMEs with financial assistance (UNIDO 2000: 209). As will be observed in Chapter 8, intimate ties between parent firms and subcontracting SMEs like in Japan's vertical *keiretsu* groups, which may relieve the shortcomings of imperfect information and absorb the risks of opportunistic behaviour, do not exist in Indonesia. Without such organisational devices, it may be difficult for parent firms to extend capital as a precious resource to small-medium supplier firms.

---

[15] As already explained in Section 2.3, this case is classified as establishment linkages, which are one of the ten linkage categories listed by Lall based on his field survey in India (1980: 208-9 and 214-5).

Table 6.3 Channels and Effectiveness of Financing Support Mechanisms for SMEs

Channels	*User Firms (N = 96)*		*Differences in No. of User Firms between Groups in Categories*			*Mean Scores of Usefulness*		*Differences in Mean Scores between Groups in Categories*		
	No. of Firms [1]		*Size* [2]	*Ethnicity* [3]	*Subsector* [4]	*Mean* [5]		*Size* [6]	*Ethnicity* [7]	*Subsector* [8]
	(%)	*Rank*	*p*-values	*p*-values	*p*-values	(s.d.)	*Rank*	*F*-values	*t*-values	*t*-values
1. *Parent Firms*	37	3	0.04 *	0.20	0.19	2.16	7	1.98	0.20	1.53
	(38.5)		(+)			(1.21)				
2. *Input Suppliers*	4	7	0.57	1.00	1.00	2.00	8			
	(4.2)					(0.00)				
3. *Banks, Financial Institutions*	68	2	0.01 **	0.11	0.09	2.66	6	6.91 **	2.07 *	0.30
	(70.8)		(-)			(0.84)		(-)	(-)	
4. *Financing from Abroad*	9	6	0.03 *	1.00	0.26	4.67	1	0.56	1.53	1.53
	(9.4)		(-)			(0.50)				
5. *Informal Financing*	34	4	0.16	1.00	0.01 **	3.44	5	0.19	1.50	0.68
	(35.4)				(+)	(1.26)				
6. *Government Credits*	12	5	0.00 **	0.00 **	0.33	4.08	3	0.74	0.90	0.63
	(12.5)		(+)	(+)		(1.00)				
7. *Self-financing*	94	1	0.58	1.00	0.54	4.35	2	1.69	0.17	2.10 *
	(97.9)					(0.91)				(+)
8. *Other*	2	8	0.54	1.00	1.00	3.50	4			
	(2.1)					(0.71)				

Notes: 1) Figures in the upper row indicate the number of firms which utilise each channel. Figures in parentheses are the share of firms with each channel in the total sample firms.

2) Differences in frequency ratios between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by *p*-values of Pearson's chi-square test. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

3) Difference in frequency ratios between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by *p*-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

4) Difference in frequency ratios between firms engaged in the automobile/motorcycle subsectors (AM) and the agricultural machinery/bicycle subsectors (AB), which is indicated by *p*-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

5) Figures in the upper row are the average of scores indicated by firms' rating from 1 (the lowest score as not at all effective) to 5 (the highest score as very effective). Figures in parentheses are standard deviation.

6) Differences in mean scores of usefulness between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by *F*-values of ANOVA. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

7) Difference in mean scores of usefulness between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by the *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

8) Difference in mean scores of usefulness between firms engaged in the automobile/motorcycle subsectors (AM) and the agricultural machinery and bicycle subsectors (AB), which is indicated by the *t*-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Around 70 percent of the sample parts supplier firms have had access to state and private banks or financial institutions.[16] However, financing from these formal banks and financial institutions was rated low at 2.66 on average. The utilisation and evaluation of these formal channels were different according to firm groups in size and ethnic categories. For smaller SMEs in particular, these financial sources were not easily accessible. Many of the smaller and *pribumi* SMEs claimed that they faced a lack of information on banks and their financial services. They also mentioned problems of high financial transaction costs, including high interest rates (especially in the crisis period and thereafter), high collateral rates (100 to 200 percent) and high unofficial commissions.[17]

Moreover, under increased pressure for greater prudential soundness after the 1997-98 economic crisis, it has been difficult for banks and financial organisations to lend money to SMEs with low creditworthiness, in part as a consequence of the absence of any institutional devices such as credit guarantee systems or special targeted programs. These observations correspond with Akatiga's study (1999), which concluded that the main issues of SME financing are 1) the limited information regarding formal financial institutions and available services from them, and 2) inability of SMEs to gain access to formal financial institutions due to low creditworthiness of SMEs and the complex and time-consuming lending procedures set by formal financial institutions. Compared with smaller and *pribumi* SMEs, larger and non-*pribumi* groups have had relatively better access to and better services from banks and financial

---

[16] Among these, there are more than 10 SMEs that have used banks primarily for receiving credit funds under government programs. Apart from such directed credit programs, they seem not to have had access to banks. Also, several of the respondents with access to formal financial institutions have had transactions for personal purposes not purely for corporate usage, even though it is difficult to distinguish exactly between the two.

[17] One venture capital company dealing with SME finance as one of its tasks pointed out that, due to the lack of information, financial institutions also need to bear high transaction costs. The costs include the assessment of financial capabilities of SME borrowers, preparations for voluminous documents and monitoring of business performance. These costs are high relative to loan size.

institutions. However, this does not necessarily mean that financial access of larger and non-*pribumi* SMEs has been sufficient. Loans from formal financial sources available to larger and non-*pribumi* SMEs often require those firms to bear high transaction costs. A few of them have mobilised their capital from abroad.[18]

In addition to the above channels in the private sector, 12 percent of the sample supplier firms have utilised government credit programs designated for SMEs. Due to the government's definition of SMEs, the establishments that have used such directed credit schemes were mostly smaller and *pribumi* SMEs.[19] The main credit programs used by the sample firms are: loans from state-owned enterprises (SOEs or BUMN) which have been required by the Indonesian government to put aside 1 to 5 percent of their net profits to help SMEs; and loans under the KUK (credit for small businesses) scheme, in which banks in Indonesia are required to allocate 20 percent of their lending to small-scale firms.[20]

According to Patten, Rosengard and Johnston (2001: 1057, 1062), the Bank Rakyat Indonesia (BRI), one of three state-owned commercial foreign exchange banks in Indonesia, provided credit products to microenterprises and SMEs even during the crisis years. After the reorganisation of BRI in 1997, its newly established strategic business unit (SBU) for retail banking provides small and medium business loans up to Rp 3 billion (US$ 430,000), while SBU for microbanking extends loans of Rp 25,000 to Rp 25 million (US$ 3-3,500) to various kinds of enterprises and business activities such

---

[18] Such SMEs are generally larger non-*pribumi* firms that have special channels with overseas financial institutions through joint venture partners, technical assistance partners, or technical licensors.
[19] Such credit programs often use the definition of the Ministry of Finance and Bank Indonesia (the central bank). They define SMEs as those firms whose production assets (excluding land and building) are less than Rp 200 million, with some preference given to *pribumi* firms. This is the reason why credits through targeted credit programs were hardly used by larger and non-*pribumi* SMEs.
[20] Significant among BUMNs is the role of PT SUCOFIND in lending money to SMEs. More than half of the sample SMEs with access to government credit programs have been financed by it. As an intermediate, APLINDO (Association of Indonesian Metal Foundry) played a crucial role in channelling potential and reliable member firms as borrowers to SUCOFINDO as a lender. In the latter scheme, commercial conditions, not preferential ones, were applied to KUK loans.

as agriculture, fish production, trading, handicraft or small industrial production, and services. However, very few SMEs in our sample took advantage of these finance opportunities offered by BRI. This may suggest that insufficient information prevents SMEs from gaining access to formal sources, even if necessary financial services become available.

Informal financing in the form of borrowing from friends and informal creditors was observed in more than one-third of our surveyed SMEs. Almost all of the sample firms have financed part or all of their business operations by themselves, even though this is not an external source. This form of financing was given the highest score of 4.35 on average, except for the rare financing tool of foreign finance. This indicates that SME owners have mainly met their financial demands with their own resources.

These results help us understand that parent firms through subcontracting linkages were not in a position to help small-medium supplier firms overcome financial constraints to any significant degree. Commercial loans from formal banks and financial institutions have been popular among larger SMEs, while government credit programs have been utilised by smaller and *pribumi* SMEs. However, neither of the financing sources were necessarily sufficient. The former imposed high transaction costs even on larger SMEs and did not serve smaller and *pribumi* SMEs well. The latter tended not to be available to larger and non-*pribumi* SMEs. Informal financing and self-financing have, to an extent, supplemented the shortcomings of such formal and external financial support.

To cope with the financial consequences of the economic crisis since the middle of 1997, the Indonesian government accelerated the restructuring of banks and other financial institutions. This streamlining may rebuild the Indonesian banking sector, reduce high transaction costs and make it more reliable and efficient. In promoting the reconstruction, it would be appropriate, at the same time, to pay attention to some adverse effects on SME financing. Most of the financial schemes specifically for SMEs in the manufacturing sector disappeared by 2000, as a consequence of an agreement between the Indonesian government and the IMF.[21] As Berry and Levy (1999: 69) pointed out, it is difficult for banks and other formal financial organisations, particularly in the aftermath of the economic crisis, to allocate their lending to the SME sector in the absence of special devices for guaranteeing the low financial confidence of SMEs and reducing the high costs of small-scale lending. Without any considerations, financial access of the SME sector, particularly smaller and *pribumi* SMEs in the manufacturing industry, may deteriorate.

6.5 Subcontracting Linkages as Support Mechanisms of SME Development

The previous sections investigated what kind of external sources SMEs utilised as support mechanisms to improve their insufficient technical, marketing and financing capabilities and how useful such external channels were for SMEs in complementing their deficient internal resources. Based on the findings in the previous sections, this section presents some concluding remarks about support mechanisms for metalworking and machinery SMEs in the Indonesian automobile, motorcycle, agricultural machinery and bicycle subsectors. Table 6.4 summarises the main findings in this chapter.

[21] This is mainly based on the Letter of Intent in January 2000 that was prepared by the Indonesian government and addressed to the IMF. The government already made a decision to remove the KUK (credit for small businesses) scheme. Accordingly, the financing programs currently available to SMEs are microfinance and SME finance that have been provided by BRI and the Liquidity Credit Scheme that restarted in 1998 and has provided credits to farmers, cooperatives and small businesses. For further details, see Urata (2000: 16-32).

Table 6.4 Main Findings: Support Mechanisms for SME Development in Indonesia

	Technological Support	*Marketing Support*	*Financing Support*
Private Channels	- Private channels through subcontracting with parent firms, peer firms and equipment suppliers were the main sources. - Assembler/higher-tier supplier firms through subcontracting transactions were very important. - The effectiveness varied according to firm size and ethnic affiliation.	- Private channels played a significant role in establishing market linkages for SMEs. - Subcontracting relationships were most helpful.	- Support from parent firms through subcontracting linkages did not function well. - Commercial loans from formal banks/ financial institutions were utilised, but they imposed high transaction costs even on larger SMEs and did not serve smaller firms well. - Self-financing was the main financial source and, together with informal financing, supplemented formal and external financial support.
Non-Public/ Collective Channels	- Associations, KADIN/KADINDA, cooperatives and NGOs were not often utilised and not very effective. - Larger SMEs utilised nation-wide organisations, while smaller SMEs used local- or grass-roots-level organisations.	- Public/collective sources provided limited marketing support. - Among them, useful were 1) joint marketing and information dissemination provided by local associations for smaller SMEs, and 2) exhibitions and trade fairs organised by national associations and central government agencies for larger SMEs.	
Public Channels	- Public technical institutions were utilised by more than one-third of the sample firms, but they were not effective. Their contribution differed according to firm size and ethnic affiliation. - Larger and *non-pribumi* SMEs used large and well-equipped technical institutions in JABOTABEK, while smaller and *pribumi* SMEs utilised UPTs and local universities.		- Government credit programs were appreciated by smaller and *pribumi* SMEs, but they were not available to larger and *non-pribumi* SMEs.

First, this chapter reveals the positive contribution of inter-firm linkages in the development of SMEs. Roughly 65-80 percent of metalworking and machinery SMEs in our sample used relationships with parent firms, peer firms and machinery/equipment supplier firms to upgrade their technological capabilities. Almost all of them utilised vertical ties with principal firms and about 80 percent also used horizontal relations with peer firms to develop access to markets for their products. Our sample SMEs appreciated these private channels through inter-firm networks as effective support mechanisms for their technological and marketing development. In particular, subcontracting linkages have played a significant role in improving technological capabilities and linking products to markets.

Compared with those inter-firm linkages in the private sector, the public and collective channels were of minor significance in enhancing capabilities of SMEs. Government agencies, industrial associations or similar organisations were not frequently utilised by our sample SMEs as effective support mechanisms for learning technologies and expanding markets.

Certainly, as Thee (1985) already pointed out, subcontracting networks in Indonesia are not so strong and are limited in terms of size and function, compared with those in Japan, as already observed in Chapter 3. However, vertical inter-firm linkages through commercial transactions in the automobile, motorcycle, agricultural machinery and bicycle subsectors seem to have started to provide the SME sector in Indonesia with a chance to complement their insufficient technological and marketing capabilities. The rapid expansion of these markets during the late 1980s and the 1990s encouraged large-scale assembler firms to boost subcontracting transactions with small-medium supplier firms and provide support mechanisms through collaborative subcontracting ties that can help SMEs improve weak technological and marketing capabilities.

Secondly, there are interesting contrasts in the sources of technical and marketing support between smaller and larger SMEs, between *pribumi* and non-*pribumi* SMEs and between SMEs in the automobile and motorcycle subsectors and those in the agricultural machinery and bicycle subsectors. Larger SMEs, non-*pribumi* entrepreneurs and firms in the automobile and motorcycle subsectors can take better advantage of technical and marketing support mechanisms through subcontracting relations than smaller SMEs, *pribumi* entrepreneurs and firms in the agricultural machinery and bicycle subsectors. On the other hand, smaller and *pribumi* SMEs tend to utilise technical collaboration with peer firms through horizontal inter-firm linkages more frequently than their larger and non-*pribumi* counterparts. This reveals that the usefulness of support channels in the private sector for the improvement of technological and marketing capabilities vary according to firm groups in size, ethnic affiliation and subsector categories.

Our findings also indicate that public and collective support in technological and marketing fields may supplement private support to some extent and help smaller and *pribumi* firms upgrade their capabilities. The provision of technical support through public technical institutions, for instance, is useful to a certain extent for the development of smaller and *pribumi* SMEs. Such support may, then, enable them to improve access to private channels of technical and marketing support and to effectively acquire technological and marketing capabilities through useful inter-firm linkages. Therefore, there is a possibility that neglect of the weak capabilities of public and collective organisations such as technical institutions for SMEs (e.g., UPTs), KADIN(DA) and industrial associations will constrain the development of SMEs.

Finally, financial support mechanisms for SMEs through vertical inter-firm linkages have not worked well, compared with technological and marketing support.

Only less than 40 percent of metalworking and machinery SMEs in our sample received financial support from parent firms through subcontracting, which was not perceived as very effective assistance. Around 70 percent of sample SMEs had access to banks and financial institutions, but many of them did not highly appreciate these formal financial channels. Almost all of the sample producers partly or fully financed their business operation and investment by themselves.

As discussed in Chapter 4, most of the SME credit programs introduced by the Indonesian government from the early 1970s did not yield fruit. McLeod (1991: 208-9) already argued that the lack of finance for SMEs was due to the shortage of entrepreneurial capabilities rather than the absence of SME credit schemes. However, in general, financial and non-financial sources in the business sector appeared not to have worked well in financing SMEs in Indonesia. Therefore, it seems recommendable for the government to take measures to help SMEs improve their access to useful and economical financial services, not by using regulation but by reducing transaction costs for both borrowing and lending parties.

The main finding in this chapter is that subcontracting ties with parent firms have functioned effectively in improving technological and marketing capabilities of our sample metalworking and machinery SMEs. This result supports our hypothesis in Chapter 2 that vertical inter-firm linkages through subcontracting transactions can encourage SMEs with limited internal sources to upgrade their capabilities. The next three chapters will therefore focus on subcontracting issues in the context of SME development, based on micro-level evidence in the Indonesian metalworking and machinery industry.

Chapter 7

The Role of Subcontracting in SME Development in Indonesia: Quantitative Evidence from SMEs

7.1 Introduction

According to Berry (1997: 7), insufficient capabilities of SMEs, as discussed in Chapter 2, make the assistance from and collaboration with LEs imperative. The typical economic logic for inter-firm cooperation between LEs and SMEs is found in the fact that LEs can do some things more efficiently than SMEs. Berry (1997: 6) pointed out that, apart from fostering entrepreneurial capabilities, one of the main determinants for the success of SME development is the establishment of useful linkages between SMEs and LEs through subcontracting arrangements. He emphasised that this kind of "linkage-inducing" arrangement is, mostly and in most places, a new and experimental issue with considerable potential.

The previous chapter clarified channels and usefulness of external support for SMEs. This qualitative survey on metalworking and machinery enterprises in the Indonesian automobile, motorcycle, agricultural machinery and bicycle industries found that subcontracting cooperation through commercial transactions was perceived as one of the most effective sources of technical and marketing support to SMEs. The finding indicated the positive role of subcontracting ties in improving technological and marketing capabilities of SMEs.

By implication, it is possible to hypothesise that subcontracting transactions contribute to the improvement of productivity of SMEs. This study assumes that causality runs from subcontracting to firm performance. Certainly, it can work the other way because parent firms may prefer more efficient SMEs as their subcontracting firms. However, many of the local SMEs in our survey established their subcontracting linkages with principal firms when they were still not fully efficient in production and technology. These SME respondents acknowledged themselves that they achieved improvements in technological, managerial and other capabilities through close interactions with parent firms under subcontracting transactions. The qualitative evidence from our interview survey supports the direction of causality from subcontracting to productivity. For example, *Firm S42* is a non-*pribumi* parts supplier firm in Jakarta and engages in stamping seats and bodies for vehicles and sub-assembling mufflers for commercial trucks. Before commencing the production of mufflers and seats, the firm was a cottage industry, which produced only small quantities of metal pallets for delivery in a very primitive way. Since the establishment of *Firm S42* in 1975, the founder and later the current president continuously improved production performance, taking advantage of technical support from *Firm A01*, an automobile assembler firm, through subcontracting linkages.

This chapter seeks to establish in a quantitative way that subcontracting linkages are an important support mechanism for the development of SMEs in Indonesia. More specifically, the study attempts to answer the following question:

(1) Can subcontracting improve production efficiency of SMEs in Indonesia? Or, does subcontracting cooperation with LEs have a positive impact on the productivity of SMEs?

In addition to this main question, the study also seeks to answer the following two supplementary questions:

(2) What major factors facilitate subcontracting business with large-scale parent firms?

(3) Are there any differences in the levels of productivity and subcontracting between different firm groups within each firm category in terms of firm size, ethnic affiliation of ownership and subsector?

To answer these questions quantitatively, our study estimates production functions and calculates indices of total factor productivity (TFP) based on micro-level data. According to Kalirajan, Obwona and Zhao (1996: 331-5), TFP growth, the growth in output not explained by input growth, can be decomposed into technical progress and technical efficiency improvement. The former, technological progress, is either capital-intensive or labour-intensive. For low income and labour-abundant countries like Indonesia, it is better for technological progress to be labour-intensive. The latter, technical efficiency change, concerns the efficient allocation of all inputs, and labour is crucial. Labour productivity is, therefore, a very important component of TFP. This is the reason why our study employs labour productivity as a measure of the contribution of subcontracting to efficiency improvement of SMEs.

As observed in Chapter 4, there are several studies which focused on subcontracting linkages in Indonesia in the context of SME development.[1] Thee (1985: 219-31) and his colleagues (Erfanie 1985: 275-88; Hamid 1985: 233-51; Sudjono 1985: 253-74), pioneers in this field, analysed vertical inter-firm networks between large assembler firms and small-medium metalworking supplier firms mainly in the diesel machine industry. Their findings in the early 1980s were that relations between LEs and SMEs in Indonesia were sparse and types of their linkages limited. They concluded that subcontracting ties in Indonesia were still weak and did not function well in extending assistance to SMEs.

However, recent studies tend to document a positive role of subcontracting linkages in the development of SMEs in Indonesia. Berry and Levy (1999: 50) pointed out that subcontracting relationships provided SMEs in Indonesia with an important opportunity to learn technology, referring to the results of their case studies in rattan furniture, wooden furniture and garment sectors. In an analysis of parent firms in bicycle and engineering sectors, Harianto (1996: 52-66) found benefits to SMEs from intensive technical linkages in subcontracting ties. Sato (1998a: 134-7) illustrated a case in which a higher-layer supplier firm in the Indonesian motorcycle industry fostered its supplier SMEs through the provision of production facilities and training programs on technology and management.

The available literature on the Indonesian SMEs has dealt with subcontracting issues in a qualitative way. This study attempts to provide a new type of evidence based on a quantitative analysis, and to statistically examine the current roles of subcontracting linkages in the development of SMEs in Indonesia. Unlike the preceding chapter, however, this chapter is designed not to compare subcontracting

[1] See, for example, Berry and Levy (1999), Erfanie (1985), Goeltom (1997), Hamid (1985), Harianto (1996), Sato (1998a, 2000a), Sudjono (1985), Supratikno (1998), Thee (1985) and Witoelar (1983). Hill (1997, 2001) provides an overview of the literature on subcontracting issues in Indonesia.

transactions to other possible supportive sources but to examine relationships between productivity of our sample SMEs and their reliance on subcontracting business.

The rest of this chapter is organised as follows. Section 7.2 gives a brief explanation of the sampling procedures and an overview of the characteristics of sample SMEs. Section 7.3 sets forth our analytical framework and Section 7.4 analyses the role of subcontracting transactions in the improvement of labour productivity of SMEs based on the results of estimating production functions. Section 7.5 compares TFP indices among different types of sample firms and also discusses the relationships between TFP and subcontracting. Section 7.6 as the conclusion answers the three questions raised above.

7.2 Survey Method and Characteristics of the Sample SMEs

This section describes the survey method and features of the sample SMEs. Since the overall explanation of these issues was already stated in Chapter 5, this section focuses on issues specifically related to this chapter. Some firm-level statistical data are also analysed as basic characteristics of our sample SMEs.

7.2.1 Survey Method

Our field research in Indonesia was carried out during 1999-2000 to obtain firm-level data and information on SMEs, which were collected through interview and questionnaire surveys. Based on several criteria and information sources explained in Chapter 5, 205 firms were identified by the purposive sampling method and these were contacted by telephone and/or facsimile. Subsequently, our interview surveys with owners (or at least directors) were carried out among 96 (93 local owned and 3 foreign affiliated) SMEs.[2] Most of the remaining 108 firms did not accept our visit.

Two main reasons for their refusal to receive us were identified in our initial telephone contact with such firms. Many of these firms rejected our request because they found no direct benefits from our survey. Unwillingness to reveal firm performance was also expressed as a reason. Even though this kind of nonresponse generates a bias, there are no clear indications of the direction of how nonresponse is related to firm performance. Also, response rates to our interview and questionnaire were around 50 percent and 30 percent, respectively, which were reasonably high. Therefore, nonresponse bias does not seem serious in this study.

After a 2- to 3-hour interview together with an inspection of the production facilities, our full questionnaire was submitted to owners (or directors). Of the 96 firms, 60 (57 local and 3 foreign-affiliated) firms returned the completed questionnaires.[3] When the questionnaires were collected, the main items were checked, and incomplete, inconsistent or unclear answers were corrected on the spot on the basis of explanations given by owners (or directors). The purpose of this intensive and face-to-face contact was to increase confidence in the data and the information collected.

7.2.2 Characteristics of the Sample SMEs

Table 7.1 presents some of the key features of the sample of metalworking and machinery SMEs in the automobile, motorcycle, agricultural machinery and bicycle subsectors in 1998. These characteristics are almost same as those indicated in Table

[2] Originally, 97 firms gave us permission to carry out our interview survey. Among them, however, one foreign-affiliated SME refused to respond to our questions after we visited its factory.
[3] Of the 37 firms which were not used as our sample in this chapter, 14 firms returned incomplete or unusable questionnaires, whereas the remaining 23 firms did not fill in the questionnaires.

5.1, although the sample size here is smaller than that in Chapter 5. Inquiry items designed for this chapter contained the sensitive data related to accounting and taxation. This likely explains a lower response rate to our questions specific to this chapter, relative to other chapters.

Table 7.1 Profile of 60 Sample SMEs in 1998

1. *Size: Number of Workers*	
1) 1 - 19	25%
2) 20 - 49	30%
3) 50 - 99	23%
4) 100 - 299	22%
2. *Ethnic Group of Entrepreneurs*	
1) *pribumi*	42%
2) non-*pribumi*	58%
3. *Location*	
1) Jakarta (and surrounding areas)	72%
2) Surabaya (and surrounding areas)	23%
3) Sukabumi	5%
4. *Subsector*	
1) automotive/motorcycle	75%
2) agricultural machinery	18%
3) bicycle	7%
5. *Year Established*	
1) - 1979	15%
2) 1980 - 1989	33%
3) 1990 -	52%
6. *Education Levels of Skilled Employees (average)*	
1) high school or less	73%
2) university (including D3)*	27%

Note: * D3 represents polytechnic (or equivalent level) graduates.
Source: Based on author's interview and questionnaire survey during 1999-2000.

The benchmark years in this chapter include 1998, the midst of the economic crisis. Therefore, many of our data do not show stable growth trends between 1993 and 1998. In principle, flow data in our survey cover one year from January to December in each benchmark year, while stock data are as of the end of each year. This means that our 1998 data were exposed to the crisis and that the trend in the data is different from those in 1993 and 1996. In order to alleviate this problem, this chapter analyses SMEs and subcontracting issues mainly in each benchmark year rather than over time.

As already observed in Chapters 4 and 5, the recent economic crisis damaged the Indonesian economy significantly. The manufacturing industry showed, in general, a decline in output during this period. However, as Sato (2000b) suggested, we also have to note that an evaluation of the damage caused by the crisis to the SME sector is not easy, because insufficient statistical data for small firms with 19 or less employees are available and the impact on SMEs is quite heterogeneous according to factors such as firm size (even within SMEs), sector, location and market orientation.

Table 7.2 indicates average labour productivity (*Y/L*), average capital-labour ratio (*K/L*) and average subcontracting ratio in 1993, 1996 and 1998 by different categories of sample SMEs. *Y* stands for value added, *L* the number of employees, and *K* capital stock in terms of tangible fixed assets consisting of machinery/equipment and buildings for productive use based on the book value of balance sheets.[4] The subcontracting ratio represents the share of sales through subcontracting transactions in the total turnover.

[4] In this section, value added and capital stock are expressed in current prices. In Sections 7.4 and 7.5, however, the study measures them in constant prices. On the definition of the main data in this chapter, see Appendix.

Table 7.2 Average Labour Productivity, Average Capital-Labour Ratio and Average Subcontracting Ratio by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector in 1993, 1996 and 1998 (Current Prices)

	1993	*1996*	*1998*
Labour Productivity (Y/L)			
(Rp thousand/person)			
size			
1 - 19	10,657	13,071	17,259
20 - 49	6,544	9,407	13,611
50 - 99	16,673	14,423	16,876
100 - 299	27,336	30,118	25,257
ethnicity			
pribumi	14,363	14,490	14,460
non-*pribumi*	17,705	18,032	20,200
subsector			
automobile/motorcycle	20,328	18,956	19,821
agricultural machinery/bicycle	7,298	7,712	11,770
Capital-Labour Ratio (K/L)			
(Rp thousand/person)			
size			
1 - 19	12,542	18,063	62,155
20 - 49	10,092	22,837	96,988
50 - 99	41,400	31,208	70,937
100 - 299	29,689	34,942	67,407
ethnicity			
pribumi	13,323	18,798	42,211
non-*pribumi*	32,868	32,434	99,778
subsector			
automobile/motorcycle	27,151	28,834	88,443
agricultural machinery/bicycle	22,013	17,762	37,838
Subcontracting Ratio (%)			
size			
1 - 19	66.0	71.8	66.3
20 - 49	53.3	62.0	74.1
50 - 99	77.5	84.9	80.1
100 - 299	85.9	88.7	81.3
ethnicity			
pribumi	60.0	66.3	65.2
non-*pribumi*	79.8	83.9	82.2
subsector			
automobile/motorcycle	81.4	82.0	78.0
agricultural machinery/bicycle	51.3	55.4	66.7

Source: Based on author's interview and questionnaire survey during 1999-2000.

Average labour productivity (*Y/L*) is described as nominal value added per employee by firm size, ethnic affiliation of owners, and subsector. Labour productivity rose with firm size, albeit that SMEs with 20 to 49 employees seem an exception. This is consistent with our observations in Chapters 3 and 4, where labour productivity, capital intensity and wages in Japan and Indonesia based on the national-level statistical data rise with firm size, with some exceptional cases. SMEs run by non-*pribumi* entrepreneurs and engaged in the automobile and motorcycle subsectors had a higher labour productivity than those managed by *pribumi* entrepreneurs and operating in the agricultural machinery and bicycle subsectors. Productivity in SMEs with 49 or less employees showed an upward trend over time, relative to productivity of those with 50 or more employees. This may imply that smaller firms suffered less during the 1997-98 crisis than larger counterparts. Stagnation of labour productivity among firms in the automobile and motorcycle industries suggests that they suffered more during the crisis than those in the agricultural machinery and bicycle industries.

Average capital-labour ratio (*K/L*) in Table 7.2 is presented in terms of nominal values of tangible fixed assets per employee. In this micro-level survey, larger SMEs had a higher capital intensity than smaller counterparts, except for some irregular cases in 1993 and 1998. This feature is basically similar to that of Japan and Indonesia based on the national-level data in Chapters 3 and 4. SMEs managed by non-*pribumi* owners and engaged in the automobile and motorcycle subsectors had a higher capital intensity in all benchmark years than those owned by *pribumi* entrepreneurs and operating in the agricultural machinery and bicycle subsectors. The likely explanation for the increase in capital intensity in 1998 are the effect of inflation, and large investments in plant and equipment in response to rapidly growing demand in 1996 and 1997, just before the crisis.

Table 7.2 also contains the average subcontracting ratio. Between 1993 and 1998, larger manufacturers with 50 or more employees relied more on subcontracting business than those with 49 or less employees. Similarly, firms run by non-*pribumi* owners and producing automotive and motorcycle parts had a higher subcontracting ratio than those managed by *pribumi* entrepreneurs and those processing agricultural machinery and bicycle parts. On the whole, the subcontracting ratio increased between 1993 and 1996, while it declined between 1996 and 1998. The decline in the subcontracting ratio seems to reflect sudden shrinkages in market size during the economic crisis.

Table 7.3 Average Annual Wages, Average Income Share of Labour and Average Rate of Returns to Capital by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector in 1998

	(1) $(\omega)^{1)}$ (Rp thousand/person)	(2) $(\omega L/Y)^{2)}$ (%)	(3) $(\pi)^{3)}$ (%)
Size			
1 - 19	5,102	52.1	41.2
20 - 49	5,586	50.7	30.5
50 - 99	6,003	48.9	36.3
100 - 299	8,714	42.5	65.1
Ethnicity			
pribumi	5,796	59.9	38.4
non-*pribumi*	6,557	41.0	44.6
Subsector			
automobile/motorcycle	6,975	49.8	39.2
agricultural machinery/bicycle	4,033	46.0	50.4

Notes: 1) ω indicates average annual wages (only monetary portion) per worker.
2) $\omega L/Y$ indicates average income share of labour in value added.
3) π indicates average rate of return to capital.
Source: Based on author's interview and questionnaire survey during 1999-2000.

Table 7.3 illustrates average annual wages (ω), average factor proportion of labour ($\omega L/Y$) and average rate of return to capital (π) in 1998 by firm size, ethnicity and subsector. Annual wages and factor share of labour reveal clear trends. Similar to labour productivity and capital intensity, annual wages per employee rise with firm size, as theoretically expected. Also, SMEs owned by non-*pribumi* entrepreneurs and producing automotive and motorcycle parts had a higher wage rate than their counterpart groups. The indicator ($\omega L/Y$) shows the opposite tendency to the average annual wages (ω). Smaller and *pribumi* firms in the sample had a higher factor proportion of labour than their larger and non-*pribumi* counterparts, because, as observed above, the former groups are generally more labour-intensive than the latter. These patterns of annual wages and average factor proportion of labour are also similar to those based on the national-level data of Japan and Indonesia in Chapters 3 and 4.

This study uses the following formula as an indicator to measure profitability:

$$\pi = \frac{(Y - \omega L)}{K} \qquad (7.2.1)$$

where π, Y, ωL, and K stand for the rate of return to capital, value added, wage costs and capital stock, respectively. The rate of return to capital (π) represents the degree of profitability with regard to capital stock for productive use.[5] Table 7.3 shows that larger SMEs tend to have a higher rate of return than smaller SMEs, except for the irregular case of those with 19 or less employees.[6] SMEs directed by non-*pribumi*

[5] This figure is not identical to 'rate of return to capital' in an accounting or management sense, because profit does not represent net operating surplus and the definition of capital is limited to only capital stock such as machinery, equipment and buildings. In addition, capital is in terms of the nominal book value in each year. However, it can be used to compare the levels of profitability in terms of capital stock between different firm groups. See Hondai (1992: 133).

[6] This increase in the profitability with firm size in our survey is similar to the patterns of India, the Philippines and Taiwan in the studies of Ohkawa and Tajima (1976) and Tajima (1978).

entrepreneurs had a higher profitability than those managed by *pribumi* entrepreneurs. In our sample survey, larger and non-*pribumi* SMEs have achieved higher returns to capital, compared with the smaller and *pribumi* SMEs.

7.3 Framework of Statistical Analysis: Estimates of Production Functions

In order to confirm the effects of subcontracting transactions on production efficiency, this chapter estimates production functions that include the subcontracting ratio as one of the explanatory variables. Based on the approach taken by Murakami, Liu and Otsuka (1996), we use the following Cobb-Douglas form as the production function:

$$Y = AK_{it}^{\alpha} L_{it}^{\beta} \bullet exp\,(\gamma\,(SUBCON)_{it} + \sum_{j=1}^{m} \delta_j (EF)_{it}^{j}) \tag{7.3.1}$$

where small-medium firm i produces value added Y, using capital stock K and labour (the number of employees) L as the set of inputs in year t (hereinafter i and t are not used for simplification).[7] Also, *SUBCON* represents subcontracting ratio and EF^j (j = 1, 2, ·····, m) refers to m kinds of other factors which are likely to affect the level of labour productivity of SMEs. This *EF* includes the following dummy variables:

[7] As the measure of labour input, this study uses the total number of persons engaged in corporate activities. Because no detailed information about working hours (actual), education, occupation or skill levels are available, it is not possible to adjust the amount of labour input according to such factors. Instead, our model introduces a dummy variable representing average educational levels of skilled workers. Also, this study may capture some variation in quality of labour between regions (urban-rural). The coefficients of these educational and locational dummy variables are expected to reflect some effects of variations in labour quality.

1) *EDU-Worker*: educational level of skilled workers (0 = firms in which average educational level of skilled workers is senior high school education or less, 1 = firms in which average educational level of skilled workers is university education including D3 (polytechnic) level);[8]

2) *FINANCE*: access to financial sources except for their own (0 = firms which face problems in having access to financial sources, 1 = firms which do not face difficulties in having access to financial sources);

3) *SECTOR*: a subsector dummy (0 = firms which supply their products mainly to automobile and motorcycle subsectors, 1 = firms which supply their products primarily to agricultural machinery and bicycle subsectors); and

4) *AREA*: a locational dummy (0 = firms located in urban areas, 1 = firms located in rural areas).[9]

Higher educational levels of skilled workers and better access to financial sources may enable SMEs to improve productivity. SMEs producing automotive and motorcycle parts, which usually have better production facilities and higher awareness of quality, are expected to show higher productivity. Firms located in urban areas, which are generally in more favourable circumstances in terms of markets for outputs and inputs, communication and transport and other infrastructure, may have higher productivity.

Through these dummy variables, this study attempts to consider differences in productivity between firms with different human resources (*EDU-Worker*), between

[8] Since *K/L* (capital-labour ratio), that is, factor allocation, may incorporate the influence of human resources of entrepreneurs, this study does not include the educational level of owners in the explanatory variables.

[9] It is possible to use a sales orientation variable (export market/domestic market), instead of the urban-rural dummy variable. However, almost all of metalworking and machinery firms in our sample, except for the very limited number of SMEs in the bicycle subsector, are not export-oriented but produce for local assembler firms. Therefore, this study adopts the urban-rural dummy variable in the present model.

those with different financial conditions (*FINANCE*), between those in different subsectors (*SECTOR*) and between those in different areas (*AREA*). Parameters α and β indicate production elasticity of capital and labour, respectively, and A, γ, and δ_j are other parameters of the production function to be estimated.

By dividing both sides of equation (7.3.1) by L and taking the logarithm with some modification, the Cobb-Douglas production function can be written as:

$$\ln (Y/L) = \ln A + \alpha \ln (K/L) + (\alpha + \beta - 1) \ln (L) + \gamma\,(SUBCON)$$

$$+ \delta_1\,(EDU\text{-}Worker) + \delta_2\,(FINANCE) + \delta_3\,(SECTOR) + \delta_4\,(AREA)$$

$$+ \varepsilon \qquad (7.3.2)$$

where ε represents error term. In this equation (7.3.2), if $(\alpha + \beta - 1) > 0$, increasing returns to scale exist; $(\alpha + \beta - 1) = 0$ indicates constant returns to scale; and $(\alpha + \beta - 1) < 0$ suggests decreasing returns to scale. The coefficient of labour, $(\alpha + \beta - 1)$, is expected to display the existence of scale economies (or diseconomies) in metalworking and machinery SMEs.

Our hypothesis is, based on the results of Chapter 6 in this study, that the effects of vertical inter-firm networks on production performance are positive, because subcontracting ties with large-scale parent firms will provide SMEs with not only commercial chances but also day-to-day stimulation and guidance in upgrading technological and marketing capabilities. In the above equation, coefficient γ tests this hypothesis. A positive γ indicates the contribution of subcontracting to the improvement of labour productivity of SMEs. Because of data constraints, effects of the qualitative intensity of subcontracting on firm performance are not explicitly taken into account in this model, except for a lagged variable of subcontracting ratio as a proxy for the length of linkages introduced in the following equation (7.3.3). This qualitative issue is dealt with in Chapter 8, which examines subcontracting mechanisms in Indonesia in a comprehensive way and reveals several elements for the better functioning of subcontracting linkages.

A positive sign of δ_1 will illustrate the effects of human resources measured by average educational levels of employees on firms' productivity. Also, $\delta_2 > 0$ indicates the important role of financial access to external sources in SME operation. The parameter $\delta_3 < 0$ will suggest higher productivity of SMEs engaged in the automobile and motorcycle subsectors than SMEs in the agricultural machinery and bicycle subsectors, while $\delta_4 < 0$ will explain locational advantages of urban compared to rural SMEs.

Equation (7.3.2) is first estimated, using the ordinary least squares method (OLS). However, there is a possibility that simultaneous equation biases will appear, if the subcontracting ratio (*SUBCON*) is an endogenous variable. In addition, because our focus is on vertical inter-firm linkages, we would like to identify the factors that explain the establishment and expansion of subcontracting transactions for SMEs. Taking these into account, our study also estimates a production function in which the subcontracting ratio (*SUBCON*) is an endogenous variable by applying the two-stage least squares method (2SLS). At the first stage, the subcontracting ratio function is estimated as follows:

$$(SUBCON) = b_0 + b_1 \ln (K/L) + b_2 \ln (L) + b_3 (EDU\text{-}Worker)$$

$$+ b_4 (FINANCE) + b_5 (SECTOR) + b_6 (AREA)$$

$$+ b_7 (ETHNICITY) + b_8 (SUBCON)_{(-1)} + \varepsilon \qquad (7.3.3)$$

where $(ETHNICITY)$ is a dummy variable that takes a value of 0 for *pribumi* entrepreneurs and a value of 1 for non-*pribumi* counterparts, $(SUBCON)_{(-1)}$ indicates a lagged variable of subcontracting ratio, and b_k (k = 1, 2, ·····, 8) refers to parameters to be estimated.[10]

In equation (7.3.3), $b_4 > 0$ suggests that stable production and reasonably equipped facilities through better financial access can increase subcontracting orders from assembler or higher tier supplier firms. The parameter $b_3 > 0$ implies that the educational levels of skilled workers are positively associated with subcontracting activities. This may reflect assemblers' preference of supplier firms which have higher levels of human resources and, therefore, have the potential to supply products of sufficient quality on time.

Similarly, $b_5 < 0$ suggests that subcontracting networks in the agricultural machinery and bicycle subsectors are less developed than those in the automobile and motorcycle subsectors. The parameter $b_6 < 0$ indicates that SMEs located in rural areas face difficulties in building close relationships with assembler firms, compared with their counterparts in urban areas. Also, $b_7 > 0$ shows that non-*pribumi* firms are likely

[10] This lagged variable, $(SUBCON)_{(-1)}$, is the subcontracting ratio in the previous benchmark year. $(SUBCON)_{(-1)}$ in 1998 refers to subcontracting ratio in 1996 and $(SUBCON)_{(-1)}$ in 1996 refers to that in 1993. For firms which do not have a subcontracting ratio in 1996 or 1993, we used the data in the nearest and available years to such particular benchmark years. If firms started their operations just in 1998 or 1996 and did not conduct subcontracting business before these years, this study used 0 as the subcontracting ratio in the previous benchmark years.

to have a chance to get large subcontracting orders through their strong business networks, in comparison with those of *pribumi* entrepreneurs. If $b_8 > 0$, the continuity of transactions with clients would be an important factor in the expansion of subcontracting business.

Based on the above specifications and primary data obtained from our questionnaire and interview survey, this study estimates equation (7.3.2) in 1993, 1996 and 1998 and equation (7.3.3) in 1996 and 1998. Between these benchmark years, particularly between 1996 and 1998, Indonesia experienced significant rates of inflation. This is reflected in, for example, an increase in the capital-labour ratio in 1998 (Table 7.2). For that reason, this study uses real value added and capital stock to estimate the production functions and subcontracting ratio functions, even though our adjustment to real values is not complete, due to data limitations (see Appendix 7.1).

7.4 Results of Statistical Analysis

Column (1) in Table 7.4 summarises the statistical results of production function in 1998 that is based on equation (7.3.2) and estimated with the ordinary least squares (OLS) method. The values in parentheses below the coefficients are *t*-values, whereas adjusted R^2 represents the coefficient of determination adjusted for the degrees of freedom.

Table 7.4 Estimation Results of Production Functions and Subcontracting Ratio Function in 1998

	(1)	(2)	(3)
	(3-2)	(3-3)	(3-2)
	ln (Y/L)	*SUBCON*	*ln (Y/L)*
	OLS	*OLS*	*2SLS*
Constant	6.58***	0.28	6.59***
	(10.28)	(1.04)	(10.25)
ln (K/L)	0.16***	0.004	0.16***
	(2.93)	(0.20)	(2.91)
ln (L)	-0.04	-0.05*	-0.04
	(-0.63)	(-1.77)	(-0.65)
Subcontracting ratio (*SUBCON*)	1.50***		1.42***
	(5.92)		(3.75)
Worker education (*EDU-Worker*)	0.22+	-0.01	0.23+
	(1.40)	(-0.16)	(1.42)
Financial access (*FINANCE*)	0.55***	0.19***	0.57***
	(3.44)	(2.96)	(3.32)
Subsector (*SECTOR*)	0.08	0.10	0.08
	(0.44)	(1.34)	(0.46)
Location (*AREA*)	-0.04	0.06	-0.04
	(-0.21)	(0.86)	(-0.23)
Ethnicity (*ETHNICITY*)		0.13**	
		(2.23)	
Subcontracting ratio$_{(-1)}$ (*SUBCON*$_{(-1)}$)		0.59***	
		(6.14)	
N	60	60	60
Adjusted R^2	0.689	0.532	

Notes: Figures in parentheses are *t*-values. *** indicates significance at the 1% level. ** indicates significance at the 5% level. * indicates significance at the 10% level. ++ indicates significance at the 15% level. + indicates significance at the 20% level.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Column (1) in Table 7.4 shows a high adjusted R^2, which indicates that the model accounts for 69 percent of the variation in labour productivity, ln (*Y/L*). The

Goldfeld-Quandt test was performed to detect the presence of heteroscedasticity of the error terms, which is a common problem with cross-sectional studies, by sorting the sample data according to firm size suspected responsible for heteroscedasticity. The result of the test for 1998 suggests that the errors are homoscedastic and that the consequence of our OLS estimation is efficient parameter estimates of the regression equation. Similarly, according to the result of the test for 1996 and 1993, the null hypothesis that the errors are homoscedastic cannot be rejected and our model does not contain heteroscedastic errors. All of the coefficients, except for that of subsector (*SECTOR*), indicate the same direction of signs as this study expected a priori and four of them are statistically significant at the 1 percent level.

The parameter of capital-labour ratio (ln (*K/L*)) is statistically significant at the 1 percent level. However, the estimated value, 0.16, which represents the production elasticity of capital, is very small. On the other hand, the coefficient of labour (ln (*L*)) is statistically insignificant and close to zero, suggesting that the production processes in the sample SMEs are not subject to scale economies or diseconomies. This can be considered as a statistical testing of the constant returns to scale. Our result is consistent with the findings of Tybout (2000: 18-9) that returns to scale are generally close to unity in studies of SMEs that estimate production functions. The value of -0.04 as the parameter of labour means that the production elasticity of labour is 0.80 (or 80 percent). This is, however, not consistent with the average factor share of labour of around 50 percent as shown in Table 7.3.[11]

---

[11] Under the assumption of competitive equilibrium in factor markets (labour and capital), the wage rate should be equal to labour's marginal productivity and the profit rate equal to capital's marginal productivity. This means the equivalence between the production elasticities and income shares of production factors. For practical purposes, the income shares of labour and capital are conventionally regarded as equivalent with production elasticities of labour and capital. See, for example, Hayami (1997: 118-9).

Griliches and Ringstad (1971) stated that the estimated production elasticity of labour largely exceeded the average factor share of labour in the Norwegian manufacturing industry. They concluded that measurement errors in capital stock caused underestimation of capital elasticity and overestimation of labour elasticity. Our study also shows differences between the production elasticity of labour (80 percent) and the income shares of labour (50 percent). The differences imply that, similar to Griliches and Ringstad, our production elasticity of labour is overestimated, whereas production elasticity of capital is underestimated, possibly because of measurement errors in capital stock caused by the lack of annual investment data and the incomplete calculation of real values. It is necessary to be aware of the possibility that such measurement errors in capital stock would result in biases in the estimates of production functions through underestimation of capital elasticity.

The coefficient of the subcontracting ratio (*SUBCON*) is positive and highly significant at the 1 percent level. In column (1), the proportion of subcontracting orders in total sales (*SUBCON*) is the dominant variable in explaining variation in labour productivity. This outcome supports our hypothesis that SMEs can upgrade their labour productivity through subcontracting business with LEs. It is consistent with the observation in Chapter 6 that a large share of sample SMEs mentioned subcontracting linkages with clients as the most effective way to improve their technological and marketing capabilities.

The human resource variable (*EDU-Worker*) indicates some positive effects of school education for skilled employees on production performance. In our field survey, many entrepreneurs expressed the need to have well-educated employees in order to develop production technology within their firms and take advantage of technical support from outside. The coefficient of external financial access (*FINANCE*) is positive and statistically significant. This means that firms capable of financing investment show better production performance than those not capable of obtaining finance.

The coefficient of subsector (*SECTOR*) is positive and not significant. This positive sign is different from our expectation that SMEs producing automotive and motorcycle parts are more efficient than those handling agricultural machinery and bicycle parts in the light of differences of characteristics, in particular quality, of products required by each subsector. This may be due in part to the special business circumstances in 1998, when the crisis damaged the automobile and motorcycle industries more than the agricultural machinery and bicycle industries. The parameter of location (*AREA*) is negative as was expected, suggesting that SMEs located in rural areas tend to find increasing labour productivity more difficult than their counterparts in urban areas. However, this variable is statistically insignificant.

Using the subcontracting ratio (*SUBCON*) as an endogenous variable and applying the 2SLS method, the simultaneous equation model in 1998 given by equations (7.3.2) and (7.3.3) is estimated. Column (2) in Table 7.4 as the subcontracting ratio function explains 53 percent of the variation in subcontracting transactions for sample SMEs. The coefficient of the capital-labour ratio (ln (K/L)) is almost zero and not statistically significant, and that of labour (ln (L)) is very small. Both indicate that capital intensity and scale effects do not have a large impact on the expansion of subcontracting transactions with assembler or higher-tier supplier firms.

The variable of external financial access (*FINANCE*) is positive and significant at the 1 percent level. This implies that SMEs with sufficient financing capabilities can more easily exploit subcontracting relationships with LEs than those without such capabilities. This is consistent with findings in our firm-visit survey that sample SMEs with poor financial access often faced difficulties in stabilising production and having sufficient production facilities. Stable production and sufficient production facilities are usually required by clients as necessary conditions for long-term business relations. As a consequence of these problems, such firms often failed to increase subcontracting orders from assembler firms.

The lagged variable of the subcontracting ratio ($SUBCON_{(-1)}$) in column (2) is also positive and statistically significant at the 1 percent level. This suggests that continuity of relationships is very important to keep and further expand subcontracting transactions with customers. SMEs have to gain trust from and build long-term relationships with assembler or higher-layer supplier firms in the development of cooperative subcontracting ties.

The coefficient of owners' ethnic affiliation (*ETHNICITY*) in column (2) is positive and statistically significant at the 5 percent level. This implies that, because of close contacts in the ethnic Chinese community, non-*pribumi* entrepreneurs tend to establish subcontracting relationships more easily than their *pribumi* counterparts. The parameters related to human resources (*EDU-Worker*) and location (*AREA*) are statistically insignificant, and their signs are not consistent with our expectations.

The statistical results of column (3) in Table 7.4 are similar to those of column (1). Equation (7.3.2) is reestimated by using the subcontracting ratio (*SUBCON*) as an instrumental variable and applying the two-stage least squares (2SLS) method. Such similar results imply that serious simultaneous biases do not exist in equation (7.3.2) estimated with OLS.

However, the coefficient of the capital-labour ratio (ln (K/L)) in column (3) is statistically significant but small (0.16), and the same as in column (1). The value of the labour coefficient (ln (L)) implies that there are no scale economies or diseconomies in this production function.

The coefficient of subcontracting ratio (*SUBCON*) in column (3) is slightly lower in terms of statistical significance than in column (1), but still significant at the 1 percent level. Thus, the estimation results using 2SLS confirm our hypothesis that SMEs can improve their labour productivity through subcontracting linkages with LEs. Similarly, financial access (*FINANCE*) and worker education (*EDU-Worker*) affect labour productivity of SMEs positively.

Table 7.5 presents the estimation results of production function and subcontracting ratio function in 1996, when the Indonesian manufacturing sector was expanding rapidly. Column (1) explains 77 percent of the variation in labour productivity (ln (Y/L)) in 1996. The adjusted coefficient of determination and most of t-values in column (1) of 1996 are higher than those of 1998. This is partly because normal economic activities of producers in a growing market are reflected in the production function for 1996. The signs of all coefficients in the 1996 model are consistent with our a priori expectations. Five parameters are statistically significant at the 1 or 5 percent level.

In column (1), the coefficient of capital-labour ratio (ln (K/L)), which means the production elasticity of capital, is positive and statistically significant at the 1 percent level. However, similar to the results in 1998, its value is small (0.20), probably due to measurement errors in fixed capital assets. The coefficient of labour (ln (L)) is almost zero and statistically insignificant, suggesting that scale economies or diseconomies do not exist in this production function.

Table 7.5 Estimation Results of Production Functions and Subcontracting Ratio Function (1998 constant prices) in 1996 and 1993

	1996			*1993*
	(1)	(2)	(3)	(4)
	(3-2)	(3-3)	(3-2)	(3-2)
	ln (Y/L)	*SUBCON*	*ln (Y/L)*	*ln (Y/L)*
	OLS	*OLS*	*2SLS*	*OLS*
Constant	6.71***	-0.18	6.71***	6.98***
	(10.09)	(-0.54)	(10.05)	(6.58)
ln (K/L)	0.20***	0.07**	0.20***	0.20*
	(2.82)	(2.15)	(2.49)	(1.70)
ln (L)	-0.003	-0.02	-0.002	-0.03
	(-0.06)	(-0.86)	(-0.06)	(-0.29)
Subcontracting ratio (*SUBCON*)	1.34***		1.35***	1.56***
	(5.36)		(2.88)	(3.56)
Worker education (*EDU-Worker*)	0.32**	0.12*	0.32**	0.01
	(2.35)	(1.67)	(2.16)	(0.03)
Financial access (*FINANCE*)	0.40***	0.10+	0.40***	0.51**
	(2.91)	(1.39)	(2.69)	(2.20)
Subsector (*SECTOR*)	-0.04	-0.14++	-0.04	-0.20
	(-0.27)	(-1.64)	(-0.25)	(-0.63)
Location (*AREA*)	-0.07	0.07	-0.07	-0.03
	(-0.50)	(0.89)	(-0.50)	(-0.10)
Ethnicity (*ETHNICITY*)		0.01		
		(0.14)		
Subcontracting ratio$_{(-1)}$ ($SUBCON_{(-1)}$)		0.36***		
		(4.24)		
N	54	54	54	27
Adjusted R^2	0.771	0.513		0.750

Notes: Figures in parentheses are t-values. *** indicates significance at the 1% level.
** indicates significance at the 5% level. * indicates significance at the 10% level.
++ indicates significance at the 15% level. + indicates significance at the 20% level.
Source: Based on author's interview and questionnaire survey during 1999-2000.

The coefficient of subcontracting ratio (*SUBCON*), which is our focal point, also has a positive and statistically significant value. Column (1) in Table 7.5 indicates that subcontracting ratio (*SUBCON*) is the key variable in explaining the variation in labour productivity. This answers our first and main question on subcontracting and productivity of SMEs.

The parameter of formal education for skilled labour (*EDU-Worker*) is positive and significant at the 5 percent level. The result indicates that higher educational levels of SME workers tend to result in higher labour productivity. The statistical results also reveal that financial access (*FINANCE*) is positively related to the level of labour productivity.

The subsector (*SECTOR*) and locational (*AREA*) variables are not statistically significant. The signs of their coefficients imply that firms engaged in agricultural machinery and bicycle subsectors and firms located in rural areas experience some disadvantages in raising labour productivity, compared with their counterparts in the automobile and motorcycle subsectors and in urban areas.

Column (2) in Table 7.5 displays the estimated results of subcontracting ratio function of 1996, which are basically similar to those of 1998. The parameters of capital-labour ratio (ln (*K/L*)) and labour (ln (*L*)) suggest that firms with a higher capital intensity tend to have a higher subcontracting ratio, while scale economies or diseconomies are not necessarily relevant to the expansion of subcontracting transactions.

In column (2), the coefficient of lagged subcontracting ratio ($SUBCON_{(-1)}$) is positive and statistically significant at the 1 percent level. This result implies that a continuous relationship promotes subcontracting business with large-scale parent firms. The parameters of worker education (*EDU-Worker*), external financial access (*FINANCE*) and ethnic affiliation of owners (*ETHNICITY*) are positive. Their signs are all consistent with our expectations that human capital, financing capabilities and networking among the ethnic Chinese have a positive impact on the development of vertical inter-firm linkages.

Column (3) in Table 7.5 exhibits the results of estimating a production function for 1996, using the estimated value of subcontracting ratio (*SUBCON*) in column (2) as an endogenous variable. The estimation results obtained from this 2SLS model are similar to those from OLS in column (1). The similarity suggests that there are no serious simultaneous equation biases for 1996, as for 1998.

Statistically significant in column (3) are the coefficients of the capital-labour ratio (ln (*K/L*)), subcontracting ratio (*SUBCON*), educational attainment of employees (*EDU-Worker*) and financial access to external sources (*FINANCE*), all of which show almost the same values and signs as in column (1) in Table 7.5.

The subcontracting ratio function by using OLS and the production function by using 2SLS for 1993 could not be estimated, due to insufficient data. Column (4) in Table 7.5 illustrates the estimation results of production function by OLS in 1993, which yields results similar to those in 1996 and 1998. Although the *t*-values for several variables are low, the adjusted coefficient of determination is still 0.75. The results in 1993 demonstrate statistical significance in the parameters of the capital-labour ratio (ln (*K/L*)), subcontracting ratio (*SUBCON*) and financial access dummy (*FINANCE*). The results reconfirm the significant roles of subcontracting linkages in raising labour productivity for metalworking and machinery SMEs.

7.5 Comparison of Total Factor Productivity

The estimated production functions in the previous section do not show the levels of productivity or production efficiency in the three different years and in the different firm groups within each category by size, ownership and subsector. To examine these, this section estimates indices of total factor productivity (TFP), using the results of our production functions. This conventional method is suggested by, for example, Christensen, Cummings and Jorgenson (1981) and Murakami, Liu and Otsuka (1996), and can simply indicate the levels of residual, in a relative sense, that cannot be explained by input increases. In addition, based on TFP indices, this section examines relationships between TFP and subcontracting linkages.

First, we estimate the TFP indices for sample SMEs as a whole for the benchmark years of 1993, 1996 and 1998, by using the following formula:

$$\ln (TFP)_t = (\ln (Y/L)_t - \ln (Y/L)_0) - \alpha (\ln (K/L)_t - \ln (K/L)_0)$$

$$- (\alpha + \beta - 1) (\ln (L)_t - \ln (L)_0) \qquad (7.5.1)$$

where subscript 0 depicts the base year of comparison, subscript t illustrates other years to be compared, and (TFP) represents the index of TFP calculated with respect to the base year. Our simple approach to measuring TFP as the residual implicitly assumes that SMEs are technically efficient and operate on their production frontier (Kalirajan, Obwona and Zhao 1996: 333-4).

Next, similar to (7.5.1):

$$\ln (TFP)_g = (\ln (Y/L)_g - \ln (Y/L)_0) - \alpha (\ln (K/L)_g - \ln (K/L)_0)$$

$$- (\alpha + \beta - 1) (\ln (L)_g - \ln (L)_0) \qquad (7.5.2)$$

where subscript *0* is the base of calculation (i.e. firms with 1-19 workers, firms of *pribumi* owners, or firms producing agricultural machinery/bicycle parts) in each SME category, subscript *g* displays other firm groups to be compared, and (*TFP*) here is the index of TFP calculated with respect to the base group *0* in each benchmark year.

According to our OLS estimates of production functions in Tables 7.4 and 7.5, coefficients of α are 0.20, 0.20 and 0.16 in 1993, 1996 and 1998, respectively, while those of ($\alpha + \beta - 1$) are -0.03, 0 and -0.04 in 1993, 1996 and 1998, respectively. Geometric means are used to calculate average values of variables in the above equations (7.5.1) and (7.5.2).

Then, the relationships between differences in TFP and those in subcontracting are investigated, by applying the following formula (Murakami, Liu and Otsuka 1996: 274-5):

$$\ln (TFP^{*})_g = \gamma\,((SUBCON)_g - (SUBCON)_0) \qquad (7.5.3)$$

where (TFP^{*}) represents the index of the contribution of subcontracting to TFP, which reflects differences in the degree of subcontracting linkages. It is calculated with respect to the base group *0*. Coefficients of the subcontracting ratio (*SUBCON*) in Tables 7.4 and 7.5, which are 1.56, 1.34 and 1.50 in 1993, 1996 and 1998, respectively, are used for the above equation (7.5.3).

Table 7.6 compares TFP indices, which are expressed relative to 1998 on the basis of equation (7.5.1). The comparison over time reveals that TFP for sample firms as a whole did not grow from 1993 to 1998. However, in consideration of negative effects caused by the crisis in 1998, the stagnant situation between 1996 and 1998 seems understandable.

Table 7.6 Comparison of Index of Total Factor Productivity (TFP) over time in 1993, 1996 and 1998[1)]

	1993	*1996*	*1998*
Comparison over time			
TFP Index (1998 = 100)[2)]	102.3	100.2	100.0

Notes: 1) This index is calculated based on 1998 constant prices.
2) 1998 is used as the base of comparison between different years.
Source: Based on author's interview and questionnaire survey during 1999-2000.

Table 7.7 Comparison of Indices of Total Factor Productivity (TFP) and Indices of Contribution of Subcontracting to TFP by Firm Size, Ethnic Affiliation of Entrepreneurs and Subsector in 1993, 1996 and 1998[1)]

	Indices of Total Factor Productivity			*Indices of Contribution of Subcontracting to TFP*		
	1993	*1996*	*1998*	*1993*	*1996*	*1998*
Comparison within each category in each year						
size (1 - 19 = 100)[2)]						
1 - 19	100.0	100.0	100.0	100.0	100.0	100.0
20 - 49	98.1	95.6	100.0	82.0	87.7	112.4
50 - 99	104.6	100.4	102.4	119.7	119.2	123.0
100 - 299	113.8	108.0	107.4	136.4	125.4	125.2
ethnicity (Pribumi = 100)[3)]						
pribumi	100.0	100.0	100.0	100.0	100.0	100.0
non-*pribumi*	107.4	104.3	106.3	136.2	126.6	129.1
subsector (agricultural machinery/bicycle = 100)[4)]						
automobile/motorcycle	112.3	109.9	104.8	159.9	142.8	118.5
agricultural machinery/bicycle	100.0	100.0	100.0	100.0	100.0	100.0

Notes: 1) The indices in this table are calculated based on 1998 constant prices.
2) The group of firms with 1-19 employees is used as the base of comparison between different size of SMEs in each year.
3) The group of firms owned by *pribumi* entrepreneurs is used as the base of comparison between different ethnic affiliation of SMEs in each year.
4) The group of firms producing agricultural machinery/bicycle parts is used as the base of comparison between different subsector of SMEs in each year.
Source: Based on author's interview and questionnaire survey during 1999-2000.

The first three columns in Table 7.7 compare TFP indices, which are expressed relative to the base group within each firm category in each year based on the results of equation (7.5.2). This indicates that larger SMEs, non-*pribumi* SMEs and SMEs in the automobile and motorcycle subsectors have generally recorded higher TFP than their counterparts, the smaller SMEs, *pribumi* SMEs and SMEs in the agricultural machinery and bicycle subsectors, in each year. These results may suggest that the former SME groups have produced their parts and components more efficiently than the latter groups. In other words, SMEs with a larger share of orders from subcontracting tend to have higher total factor productivity.

The next three columns in Table 7.7 show indices of the contribution of subcontracting to TFP, which are expressed relative to the base group within each firm category in each year based on the results of equation (7.5.3). This comparison of TFP attributable to the dependence on subcontracting business between different firm groups shows almost the same trends compared to the results of the first three columns. The influence of subcontracting on TFP has generally been more significant in larger SMEs, SMEs run by non-*pribumi* owners and SMEs producing automotive and motorcycle parts than in smaller SMEs, SMEs managed by *pribumi* entrepreneurs and SMEs supplying agricultural machinery and bicycle parts. SMEs with a larger contribution of subcontracting to TFP are SMEs that have higher TFP. Overall, these observations in this section imply that subcontracting transactions are very likely to improve the productivity of SMEs.

7.6 Subcontracting and Productivity of SMEs

As indicated above, due to measurement errors in capital stock, the production elasticity of capital may be underestimated, which results in biases in the estimated production functions. Besides, the sample size was relatively small and some of the data obtained from our field survey were affected by the crisis.[12] Despite these shortcomings, our micro-level evidence from the metalworking and machinery industry yields the following findings, which allow us to answer the three questions set forth in Section 7.1 of this chapter.

With regard to the first and main question, this chapter found that the role of subcontracting linkages in improving labour productivity of SMEs is pivotal. According to the estimated production functions, the subcontracting ratio is the dominant variable in explaining variation in labour productivity. Also, indices of TFP vary in line with the reliance on subcontracting. These findings confirm our hypothesis that vertical inter-firm cooperation through subcontracting ties can increase productivity in small-medium metalworking and machinery firms in Indonesia.

Earlier research represented by Thee and his colleagues (1985) argued that subcontracting networks in the Indonesian machinery industry were weak and did not provide SMEs with opportunities to sufficiently improve technical and other capabilities. Our findings point to a different conclusion. They indicate that subcontracting linkages have strengthened and are beneficial to SMEs in improving their productivity. These results quantitatively support recent studies by, for instance, Berry and Levy (1999), Harianto (1996), Sato (1998a) and Thee (1997), which

[12] Some effects of the crisis are reflected in the sign of the dummy variable for sector in 1998. However, this chapter cannot examine in detail the complicated effects of the crisis on SMEs and on subcontracting in the 1998 data set, because that was beyond the scope of our study.

observed the development of subcontracting networks and the provision of support to SMEs through such linkages in the process of industrialisation in Indonesia.

The difference between Thee's findings in the 1980s and ours in the 1990s could be attributed to the progress of industrialisation in Indonesia and changes in industrial organisation since the mid-1980s, when the pace of industrialisation accelerated.[13] Also, it is possible that such different conclusions were reached because the two parties analysed different SME groups. Thee and his colleagues focused on smaller SMEs in the diesel machinery subsector, while this study covered not only smaller SMEs in the agricultural machinery subsector but also larger SMEs in the automobile and motorcycle subsectors. This issue will be addressed below in our answer to the third question.

The estimated production functions provided additional findings in relation to factors for increasing labour productivity. Higher levels of formal education for skilled workers and better access to financial sources are positively related with labour productivity of SMEs.

Concerning our second question, the estimation of subcontracting ratio functions reveals that better financial access and business continuity are important in facilitating subcontracting transactions, which can provide SMEs with the support they require in order to improve their productivity. These findings imply that financial capabilities and creditworthiness are required to expand subcontracting transactions. Parent firms are likely to prefer supplier firms that are reliable, are able to maintain production at a stable level and have reasonably modern production facilities.

[13] Hill (2001: 263) suggested that the results of Thee's study reflected the nature of Indonesian industrialisation in the early 1980s, when the country was still in its industrial infancy, while subcontracting linkages have generally become stronger over time in the 1990s, when firms in the modern sector have moved rapidly into more sophisticated areas of industrialisation.

On the last question, the estimated subcontracting ratio functions illustrate that non-*pribumi* owners expand subcontracting business more easily than their *pribumi* counterparts. While different firm groups in other firm categories (i.e. firm size and subsector) did not significantly affect the levels of labour productivity and subcontracting transactions, most of the signs of the coefficients related to such firm categories were consistent with the initial expectations. Based on the comparison of TFP indices, larger SMEs, non-*pribumi* SMEs and SMEs supplying automotive and motorcycle parts have, in general, a higher TFP than smaller SMEs, *pribumi* SMEs and SMEs producing agricultural machinery and bicycle parts. The results indicate that there are differences in the level of total factor productivity between the former and the latter SME groups in each firm category of firm size, ethnic affiliation of entrepreneurs and subsector.

These differences are consistent with the conclusions of Berry and Levy (1999: 70) and Chapter 6 of this study. They pointed out that, compared with their counterparts, larger SMEs and non-*pribumi* SMEs have better access to support mechanisms in the private sector, in particular subcontracting linkages, which improve technological and marketing capabilities of SMEs and reduce the transaction costs that SMEs face. Different SME groups have uneven access to subcontracting networks and this may be one of the key factors that explain differences in the efficiency of production.

Appendix 7.1 Description of the Main Data

Our questionnaire survey provides data and information on input and output variables in 1993, 1996 and 1998: expenditures on intermediate inputs and direct costs; employment; book value of fixed assets; and sales. Using such data and information in the following way, this study estimated the production functions and subcontracting ratio functions at firm level.

The data on expenditures for productive use include 1) raw materials and intermediate inputs, 2) utilities (water, fuel, electricity and gas), and 3) other direct costs (spare parts, consumable materials, packaging materials and so on). Raw materials and intermediate inputs are deflated by a composite wholesale price index of metal and machinery, which was obtained from the *Buletin Statistik Bulanan: Indikator Ekonomi* (or *Monthly Statistical Bulletin: Economic Indicators*, hereinafter referred to as the *Bulletin*), published by the Indonesian Central Bureau of Statistics (BPS). Expenditure on utilities is deflated by a consumer price index of fuel, electricity and water from the *Bulletin*. Due to a lack of adequate price indices, other direct costs are deflated by the general wholesale price index for the manufacturing sector from the *Bulletin*. These three expenditures are aggregated into total firm expenditures.

Total firm sales are deflated by a composite producer price index of machinery and transport equipment, which is calculated from the *Bulletin*. Value added (Y) as output data in this study is defined as total firm sales minus total firm expenditures, both of which are deflated by different price indices (see above) according to the double-deflation method.

The subcontracting ratio (*SUBCON*) is defined as the share of sales through subcontracting transactions in total firm sales. The labour input (L) is measured as the number of production and non-production employees.

Capital stock is measured on the basis of data for tangible fixed assets for productive use consisting of 1) machinery and equipment and 2) buildings in 1993, 1996 and 1998 in terms of nominal book value (after the deduction of depreciation expenses) on firms' balance sheets. Assuming that annual net fixed capital investments were made to the same amount in each year between 1993 and 1996 and between 1996 and 1998, yearly net investment values for machinery & equipment and buildings during 1993-1998 were calculated. Annual net investment values for machinery and equipment are deflated by a wholesale price index of machinery from the *Bulletin*. Those for buildings are also deflated by a wholesale price index of construction materials for other buildings from the same source. Under the assumption of no price change in capital goods before 1993, we add up such real values of annual net investment on nominal values of fixed capital assets in 1993 to obtain real values of capital stock (K) for the analytical purpose of this study.[14]

It is acknowledged that biases may arise from measurement errors caused by this method of measuring capital stock in constant prices and the calculation of capital stock without exact data on annual investment. Incomplete price adjustment to capital stock, in particular before 1993, may result in an underestimation of the production elasticity of capital and, therefore, lead to biases of not only the coefficients for capital-labour ratio (α and b_l) but also those for other variables in equations (7.3.2) and (7.3.3). However, according to Griliches and Ringstad (1971), these biases are not likely to be

[14] In the case of firms which were established after 1993 or whose data were available only after 1993, this study adopts a similar procedure: assuming that nominal fixed investments were made equally in each year during the period when the data were available, such annual investment values are deflated by the above price indices and added to tangible fixed asset values in the year available.

significant, because measurement errors in capital stock would not seriously bias the estimate of the scale effect.

Chapter 8

Subcontracting Linkages and SME Development in Indonesia: Qualitative Evidence from SMEs

8.1 Introduction

The potential role of subcontracting relationships in the development of SMEs was discussed in Chapter 2. Chapter 6 confirmed that subcontracting linkages with LEs have been one of the most important sources in improving technological and marketing capabilities of Indonesian metalworking and machinery SMEs. Chapter 7, based on the estimates of the production function and TFP indices of a sample of firms, suggested that the existence of subcontracting transactions is likely to increase productivity of SMEs.

This chapter explores the detailed characteristics and functions of subcontracting linkages from the perspective of SMEs. It examines subcontracting relations in the Indonesian metalworking and machinery industry with the aim of understanding how they support the development of SMEs. This chapter addresses the following questions:

(1) Why do SMEs exploit subcontracting transactions with large-scale parent firms?

(2) How do SMEs initiate business relationships with LEs?

(3) What type of linkages with LEs do SMEs have through subcontracting business?

(4) What kind of costs and benefits have SMEs borne that are associated with and obtained from subcontracting transactions? How significant are they?

(5) What are the conditions for larger gains from subcontracting ties?

In answering these questions, this study will describe the mechanisms of subcontracting linkages that existed in Indonesia at the time of our survey.

The questions 1, 3 and 4 were already formulated in Chapter 2, particularly Section 2.3, on the basis of the existing literature.[1] Reflecting the discussion in Chapter 2, Table 8.1 identifies main possible motivations for, benefits from, costs associated with and linkage types of subcontracting transactions with LEs. Each of these categories will be discussed in more detail in Sections 8.3-8.6.

The second question has not been discussed in Chapter 2 in an intensive way. On this issue, Nabi (1985: 12-3) observed in his case study of the agricultural machinery industry in Pakistan how SMEs approached parent firms to initially establish subcontracting relations. He concluded that, relative to impersonal links, personal contacts between the two parties were important in the initiation of subcontracting business. Contracts tended to be awarded by principal firms to SMEs with owners who previously worked for parent firms, and to those who had relatives with close relations to parent firms. Our case study may confirm this.

[1] In addition to our discussion in Chapter 2, this study refers to Hill (1985: 250-5) and Thee (1985: 229-30) for the third question, and Berry (1997: 20-1), Lall (1980: 224), and the Japanese Small and Medium Enterprise Agency (1967: 289, 1998: 98) for the fourth question.

Table 8.1 Description of Items Listed in Motivations, Benefits, Costs and Linkage Types: Subcontracting with Large-scale Parent Firms

Items	Description
Motivations for and Benefits to SMEs	
1. Lower Costs associated with Contracting/Business	the reduction of costs such as the collection of information on potential parent firms, negotiation of contracts, adjustment of contracts, and concern about opportunistic behaviours of parent firms, by establishing close relations with parent firms.
2. Technical Support	various types of technical support from parent firms.
3. Managerial Support	various types of managerial support from parent firms.
4. Provision of Large/Stable Orders	large and/or stable order from parent firms over a long term.
5. Financial Support (except for 6. below)	financial support from parent firms in the forms of credit, bank guarantees, reasonable payment conditions for SMEs, etc.
6. Provision of Inputs and Tools	the use of input materials and tools (e.g., die and mold) supplied by parent firms.
7. Specialisation	the specialisation in particular processes (e.g., casting, machining, stamping) and the realisation of efficient resource allocation.
Costs for SMEs	
1. Initial Finding of Parent Firms	search for potential parent firms under the conditions of limited information.
2. Competition	competition with rival SMEs for seats as supplier firms.
3. Small Markets	difficulties in enjoying economies of scale due to relatively small and segmented markets.
4. Penalty	penalty imposed by parent firms for SMEs' failure to satisfy their requirements.
5. Quick Response	efforts to quickly respond to instructions/claims from parent firms.
6. Shift of Loss	transfer of loss from parent firms without reasonable explanation.
7. High Quality	required high quality levels (low defect ratios).
8. High technology	required high levels of production technologies and skills in the areas of process design, process technology, die/mold making, production line arrangements, etc.
9. Low Prices	required lower prices of products.
10. Strict Delivery Timing	arrangements to satisfy required delivery timing.
11. Large Production Capacity	expansion of production capacity to meet required quantity of output.
12. Expensive Input Materials	purchasing of raw materials and intermediate inputs that are often expensive and difficult to obtain domestically.
13. R&D	implementation of costly and difficult R&D activities.

Table 8.1 Description of Items Listed in Motivations, Benefits, Costs and Linkage Types: Subcontracting with Large-scale Parent Firms (continued)

Items	Description
Linkage Types SMEs have with Parent Firms	
1. Support of Establishment	assistance from parent firms in establishing new supplier firms through the provision of credit, capital participation, guarantee of order, etc.
2. Large/Stable Orders	large and/or stable order over a long term (with some exceptions during an economic fluctuation period).
3. Technical Specifications	detailed technical specifications (including detailed technical instruction and drawing).
4. Lending of Tools	the use of tools (e.g., dies and molds) supplied by parent firms.
5. Advice on Machinery	advice on the selection and layout of machinery and equipment.
6. Provision of Used Machinery	the purchasing of second-hand machinery and equipment at cheaper prices.
7. QC Support	transfer of QC technique (including testing/inspection methods and acquisition of industrial standards) through expert dispatch, training, etc.
8. Production Technology Support	transfer of production technologies and skills in the areas of process design, process technology, die/mold making, production line arrangements, etc. through expert dispatch, training, etc.
9. Joint Design	joint activities between parent firms and SMEs in the area of product design and development.
10. Managerial Support	transfer of managerial skills such as managerial planning, sales management, procurement management, human resource management, financial management, accounting, etc.
11. Provision of Inputs	the use of input materials supplied by parent firms.
12. Provision of Credit/Guarantees	financial support, such as credit and bank guarantees, provided by parent firms.
13. Reasonable Payment Conditions	reasonable payment conditions for SMEs (e.g., down payment, and accelerated payment) arranged by parent firms.
14. Price Negotiations	reasonable negotiation with parent firms to determine prices of products and services.
15. Market Information	the use of information on new markets (products, clients, etc.) given by parent firms.

Note: Several contradictory items are included in the table. For example, Provision of Large/Stable Orders in motivations and benefits and Small Markets in costs contradict each other. It is possible that some auto parts supplier firms have a large and stable order through subcontracting transactions with parent firms within the limits of the current smaller automobile market. However, they may consider that the subcontracting market of auto parts and components is so small that they cannot necessarily enjoy economies of scale and that, if the market size had been larger, they would have had a larger order. In this way, the degree of merits and demerits of subcontracting with parent firms in the above list is not an absolute indication but relative one.

The last question also requires further introduction. Berry (1997: 10, 20) explained that subcontracting linkages rest on elements of: 1) human infrastructure and the capacity of firms to interact efficiently; 2) mutual trust, mutual interest and inter-personal respect; 3) cultural and ethnic groups; 4) quality of markets and information; and 5) physical infrastructure. These factors affect the establishment and functioning of vertical inter-firm cooperation. Baranson (1967: 68-9) perceived low skills of workers and lack of industrially disciplined small-scale entrepreneurs as the key factors that prevented SMEs in the Indian diesel machine industry from establishing effective subcontracting ties. In addition, Lall (1980: 222) suggested that firm size was one of the important determinants of the nature and strength of linkages. Odaka (1983: 354-5) pointed out that characteristics of the subsector such as the length and divisibility of production processes and expected quality levels of products would differentiate the intensity of subcontracting relations between large-scale assembler firms and small-medium supplier firms. Longer and divisible processes and higher quality levels of products would intensify subcontracting ties between LEs and SMEs. Nabi (1985: 17-8) implied that location of SMEs was one of the factors for characterising subcontracting transactions. He described the importance of locational proximity and good access to parent firms, material supplier firms and information sources.

In this chapter, Section 8.2 briefly explains the sampling method and the main characteristics of our sample SMEs. Section 8.3 shows why SMEs exploit subcontracting with parent firms and how SMEs initially established business linkages with them. Section 8.4 indicates the linkage types that SMEs have through subcontracting with LEs. Section 8.5 examines revealed benefits that SMEs actually obtained from subcontracting transactions with LEs, after an investigation of the costs associated with subcontracting business.[2] Section 8.6 explores conditions for larger gains from subcontracting cooperation. Based on the analysis in the prior sections, this chapter concludes with answers to the five questions raised in the introduction.

8.2 Survey Method and Characteristics of the Sample SMEs

Of the 96 (93 local and 3 foreign-affiliated) metalworking and machinery SMEs in the automobile, motorcycle, agricultural machinery and bicycle subsectors, 73 (70 local and 3 foreign-affiliated) firms responded to questions in our interview and questionnaire necessary for the analysis of this chapter. The remaining 23 sample SMEs did not provide us with sufficient data and information.[3] Table 8.2 shows the basic characteristics of 73 sample SMEs in 1998, which are almost the same as those indicated in Chapter 5.

Figure 8.1 shows an example of current subcontracting networks in the Indonesian automobile and motorcycle subsectors, based on our survey of SMEs and parent firms. Most of the first-tier supplier firms are larger-scale foreign-affiliated companies, while their second- and third-tier counterparts are smaller-scale local producers. As already discussed in Chapter 5, assembler firms even in the automobile and motorcycle subsectors do not necessarily have a large number of supplier firms. Larger-scale first-layer producers also do not have many smaller lower-tier subcontracting supplier firms. Our field observations lead us to conclude that vertical *keiretsu* subcontracting groupings have not emerged in Indonesia, and that almost all of

[2] Due to data limitations, in Chapters 8 and 9, benefits from and costs associated with subcontracting are analysed not in monetary terms, but in a qualitative way. This is different from the conventional cost-benefit analysis. Benefits may be understood as "advantages" and costs as "disadvantages."
[3] Since this chapter does not require the specific data related to accounting and taxation, the number of respondents here is larger than that in the sample used in Chapter 7. The 23 firms that did not answer our questions stated that they did not find benefits from our survey or were not willing to disclose their firm activities.

subcontracting firms do not have a single assembler firm as a client but tend to supply products to several parent firms, reflecting the limited market size in Indonesia.

Table 8.2 Profile of 73 Sample SMEs in 1998

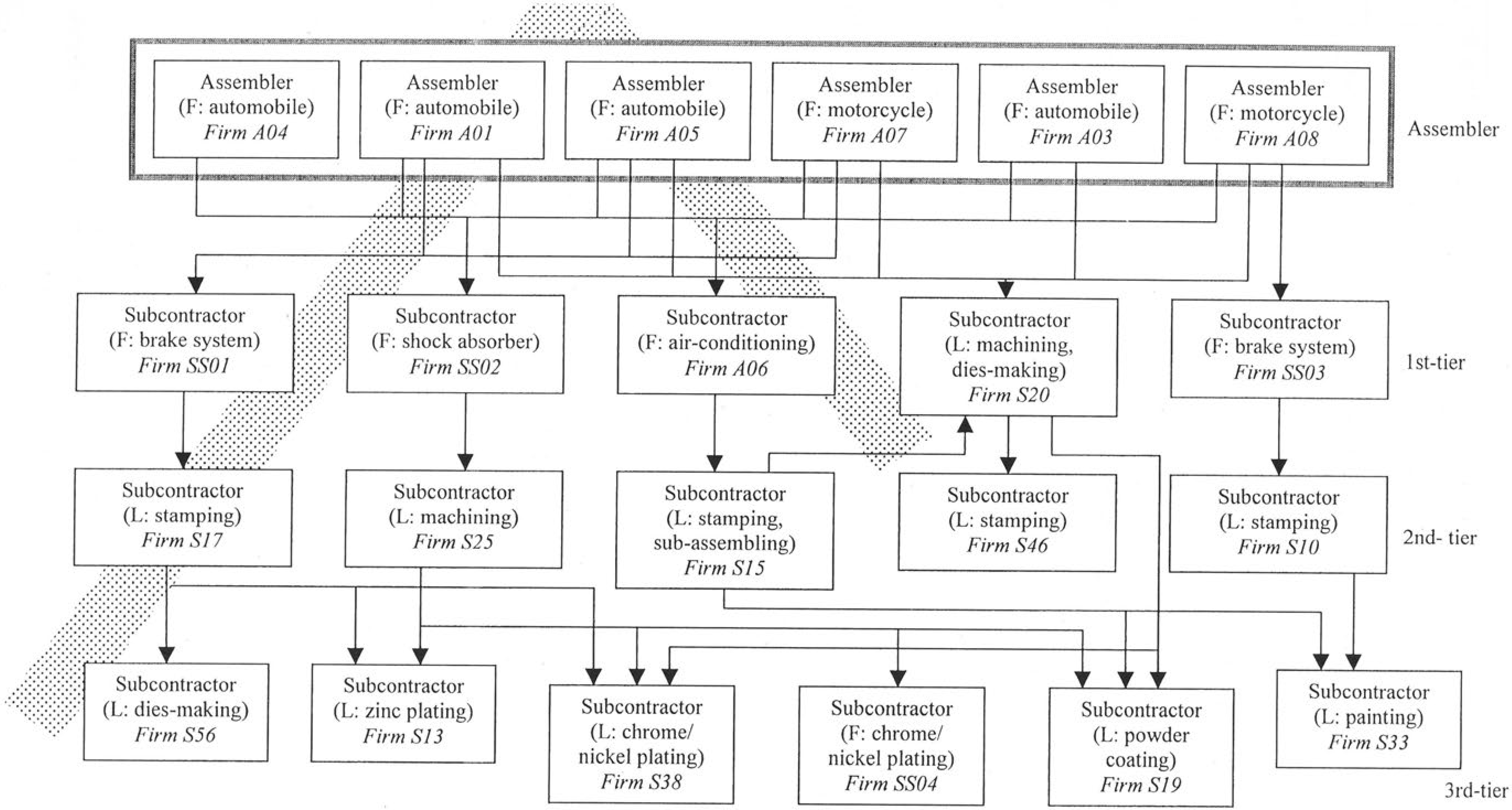
1. *Size* : *Number of Workers*	
1) 1 - 19	26%
2) 20 - 49	26%
3) 50 - 99	23%
4) 100 - 299	25%
2. *Ethnic Group of Entrepreneurs*	
1) *pribumi*	40%
2) non-*pribumi*	60%
3. *Location*	
1) Jakarta (and surrounding areas)	74%
2) Surabaya (and surrounding areas)	21%
3) Sukabumi	4%
4) Bandung	1%
4. *Subsector*	
1) automotive/motorcycle	74%
2) agricultural machinery	19%
3) bicycle	7%
5. *Major Manufacturing Processes* [1]	
1) multi-processes	27%
2) casting	7%
3) forging	2%
4) machining	29%
5) press/stamping	27%
6) others	8%
6. *Year Established*	
1) - 1979	18%
2) 1980 - 1989	33%
3) 1990 -	49%
7. *Educational Levels of Entrepreneurs*	
1) high school or less (including D3)[2]	58%
2) university	42%
8. *Educational Levels of Skilled Employees (average)*	
1) high school or less	78%
2) university (including D3)[1]	22%

Notes: 1) Major manufacturing processes represent main technological activities or areas that each firm deals with in subcontracting business. Multi-processes indicate two or more technological areas among 2) casting to 6) others and sub-assembling of parts/components. Others include plating, heat treatments, surface treatments, welding and painting.

2) D3 represents polytechnic (or equivalent level) graduates.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Figure 8.1 An Example of Subcontracting Chains in the Indonesian Automobile and Motorcycle Industry



Note: F and L in parenthesis represent foreign-affiliated and local supplier firms, respectively.
Source: Based on author's interview and questionnaire survey during 1999-2000.

In comparison with a typical Japanese case, as summarised in Figure 3.3, the scale of subcontracting in Indonesia is still very limited. The subcontracting structure in the Indonesian automobile and motorcycle subsectors has been underdeveloped in depth and size. However, as Sato (1998a) noted, subcontracting networks in these subsectors have expanded in recent years. This study found at least three-tier subcontracting chains under large assembler firms.

8.3 Motivations for and Initiation of Subcontracting Linkages with Parent Firms

This section examines the first and second questions raised above. It investigates what benefits the sample SMEs expected from subcontracting business with LEs and how they initially had access to parent firms.

8.3.1 Motivations for Subcontracting Linkages with Parent Firms

Table 8.3 shows the main reasons why the sample SMEs started to conduct subcontracting transactions with large-scale assembler firms. The table contains the degree of their expectations of the benefits from subcontracting transactions with LEs and the differences in its mean scores between groups in firm categories of size, ethnic affiliation and subsector. The meanings of listed motivations for subcontracting business are explained in Table 8.1.

Table 8.3 Motivations for Subcontracting Transactions with Parent Firms

Motivations	*Mean Scores*[1] *and Rank*		*Differences between Groups in Firm Categories*		
	All (s.d.)	*Rank*	*Size*[2] F-values	*Ethnicity*[3] t-values	*Subsector*[4] t-values
1. *Lower Costs associated with Contracting/Business*	3.18 (0.84)	3	2.70	0.61	4.41 ** (-)
2. *Technical Support*	4.14 (1.08)	2	0.56	0.65	1.50
3. *Managerial Support*	2.79 (1.44)	5	0.44	1.85	1.28
4. *Provision of Large/Stable Orders*	4.70 (0.57)	1	0.52	0.53	0.86
5. *Financial Support (except for 6. below)*	2.53 (1.29)	7	5.88 ** (+)	6.69 ** (+)	2.36 * (+)
6. *Provision of Inputs and Tools*	2.67 (1.43)	6	4.41 ** (+)	3.68 ** (+)	0.51
7. *Specialisation*	2.97 (0.90)	4	0.11	1.01	3.33 ** (-)
Number of Sample Firms	73				

Notes: 1) Figures in the upper row are the average of scores indicated by firms' rating from 1 (the lowest score as not at all important) to 5 (the highest score as very important). Figures in parentheses are standard deviation.

2) Differences in mean scores between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by F-values of ANOVA. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

3) Difference in mean scores between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by the t-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

4) Difference in mean scores between firms engaged in the automobile/motorcycle subsector (AM) and the agricultural machinery and bicycle subsector (AB), which is indicated by the t-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Provision of large and/or stable orders was rated at the highest average score of 4.7 on a five-point Likert-type scale, where "5" represents the highest degree of expectation and "1" the lowest. Without any significant differences between groups in firm categories of size, ethnic affiliation of owners, and subsector, most of the surveyed

SMEs had hoped that subcontracting transactions would work as devices to have a large/stable amount of orders and to avoid an excess of competition in markets. The small-medium producers were counting on parent firms through subcontracting relations to help them overcome difficulties in establishing a large/stable market, which Table 5.2 of Chapter 5 identified as one of the main problems at the start of operations and at present.

For example, *Firm S12* has produced leaf springs for vehicles in Jakarta since 1977. It largely expected subcontracting relations to stabilise the volume of orders. The firm has hoped that subcontracting transactions would reduce uncertainties about future demand conditions and would enable it to make long-term commitments to leaf spring production associated with fixed investment in specialised equipment. *Firm S85* in Surabaya reduced the share of spot-basis transactions in the middle of the 1990s and substantially increased that of subcontracting business with a non-affiliated Indonesian bicycle manufacturer (*Firm A12*), with the expectation of raising and stabilising sales.

Technical support was raised as the second most important inducement to start and continue subcontracting transactions with large-scale principal firms. An average score of 4.14 indicates that the sample SMEs largely expected subcontracting linkages to function as a channel for technical assistance. Similar to the market problems mentioned above, limited access to production technology is one of the most serious problems SMEs faced at the initial stage and at present (see Table 5.2). Regardless of sub-categories, the sample SMEs expected that subcontracting relationships would provide them with an opportunity to improve their technological capabilities in the form of several linkages that will be observed below in Section 8.4. For example, a press parts supplier firm (*Firm S48*) in Jakarta stated that it was keen to take advantage of technological support offered by large-scale automobile and motorcycle assembler firms through vertical inter-firm relations, because there were very few other sources that could provide it with sufficient technical guidance in the subsectors. Another SME (*Firm S68*) in Surabaya, which supplies valves to a local agricultural machinery assembler firm (*Firm A10*), wanted to establish subcontracting linkages with automobile manufacturers in order to acquire more advanced knowledge on production technologies.

With regard to managerial technology, however, the metalworking and machinery SMEs we surveyed did not have high expectations of the support they could possibly receive through subcontracting cooperation. *Firm S86*, which produces bicycle parts in Surabaya, expressed unwillingness to open its internal management activities to the scrutiny of customers. This is a possible reason why sample SMEs did not raise managerial assistance from parent firms as main motivations for subcontracting.

Lower costs associated with contracting and business and higher specialisation in certain manufacturing products or processes (e.g., casting, machining, press/stamping or sub-assembling of parts) were ranked third and fourth as motivations for having subcontracting ties, with average scores of 3.18 and 2.97, respectively. Our sample SMEs expected that subcontracting business would reduce transaction costs associated with the collection of information, uncertainties and risks, bargaining and decision-making, and preparation for and enforcement of contracts. They also expected that vertical inter-firm linkages would promote specialisation in particular production activities leading to better resource allocation. SMEs in the automobile and motorcycle subsectors emphasised these two motivations more strongly than those in the agricultural machinery and bicycle subsectors. The *t*-tests indicate that the differences between the two groups are statistically significant at the 1 percent level. The automobile and motorcycle subsectors tend to have more complicated business practices and a wider range of manufacturing processes than the agricultural machinery and bicycle subsectors.[3] The former group is, therefore, more conscious of costs associated with contracting and business and of the scope of technological activities than the latter group.

A small-scale firm (*Firm S16*), located in the small industries estate in Pulogadung, Jakarta (PIK Pulogadung), initiated the production of press parts for motorcycles sold to the after-market (spot-basis replacement parts market) in 1990. Since such one-off exchanges were time-consuming and costly in arranging business, *Firm S16* started subcontracting transactions with large-scale automobile and motorcycle assembler firms in the mid-1990s. *Firm S48*, the press parts supplier firm, wanted to concentrate on the production of specific products to enjoy economies of scale and efficient allocation of factor resources. The firm, therefore, expanded the degree of subcontracting business with large-scale automobile assembler firms over time.

The supply of input materials and tools and the provision of financial support were deemed less important, with average scores of 2.67 and 2.53, respectively. The ratings in these motivations varied considerably according to size, ethnic affiliation and subsector of firms. A small-scale *pribumi* firm (*Firm S93*) producing stamping parts for bicycles reported that it expected financial assistance through vertical inter-firm linkages. This firm attempted to increase the share of subcontracting business, because it expected from parent firms some financial arrangements such as better payment conditions and the supply of input materials, which could not generally be provided

[3] For example, assembler firms in the automobile and motorcycle subsectors often need appraisals of capabilities of supplier firms that delay the start of business. Transactions in the automobile and motorcycle subsectors require supplier firms to prepare data, information or documents for such appraisal activities. Once subcontracting transactions start, supplier firms are generally able to continue business without much additional costs for new contracts.

through one-off transactions in the spot market. The ANOVA and *t*-tests show that smaller SMEs, *pribumi* entrepreneurs and firms engaged in the agricultural machinery and bicycle subsectors expect more of such input procurement and financial support from parent firms than larger SMEs, non-*pribumi* entrepreneurs and firms engaging in the automobile and motorcycle subsectors. This indicates that the former types of SMEs do not have good access to alternative financial sources, compared with the latter types.

To simplify the motivations of SMEs for engaging in subcontracting business with large-scale assembler firms shown in Table 8.3, this study employs factor analysis.[4] This technique can identify a relatively small number of principal factors, based on correlations among a set of variables. In other words, it translates a large number of variables into a smaller number of derived factors. Variables with high loading values on a factor tend to be highly correlated with each other and those with low loading values tend to be less correlated. Each factor is interpreted according to a combination of variables with high loading values within it.

Operationally, the computations of factor analysis here were performed using a principal components extraction with varimax rotation. Table 8.4 presents a matrix of factor loadings concerning the reasons why SMEs have conducted subcontracting transactions with parent firms, together with Eigen values and the percentage of explainable variance in the total sample variance. The selection of factors to be extracted and listing of loading values were based on the criteria of eigen values greater than one and factor loadings greater than 0.4, respectively. The reliability of each factor in this chapter was assessed with the Cronbatch coefficient, with the commonly used criteria of its value being higher than 0.70.

---

[4] For example, Rabellotti and Schmitz (1997) investigated the heterogeneity of SMEs belonging to the same cluster in Italy, Brazil and Mexico, based on factor analysis.

Table 8.4 Matrix of Factor Loadings: Motivations for Subcontracting Transactions with Parent Firms

Motivation Variables	*Factor 1* *Technical and Marketing Support*	*Factor 2* *Financial Support*	*Factor 3* *Specialization and Lower Transaction Costs*
1. *Technical Support*	0.87		
2. *Managerial Support*	0.66		
3. *Provision of Large/Stable Orders*	0.58		
4. *Financial Support*		0.84	
5. *Provision of Inputs and Tools*		0.73	
6. *Lower Costs associated with Contracting and Business*			0.79
7. *Specialisation*			0.75
Eigen Value	1.93	1.43	1.15
Percentage of Variance Explained (%)	27.5	20.4	16.4
Cumulative Percentage (%)	27.5	47.9	64.3
Number of Sample Firms = 73			

Note: Loading values are not listed if they are smaller than 0.40.
Source: Based on author's interview and questionnaire survey during 1999-2000.

As a result of factor analysis, three principal factors were extracted, which together accounted for 64.3 percent of the total sample variance. The first factor explains 27.5 percent of the variance and is labelled *Technical and Marketing Support*, which is a combination of three variables of technical support (with a factor loading of 0.87), managerial support (0.66) and provision of large/stable orders (0.58). This factor is crucial, because it includes two variables with the first and second highest mean scores of motivations for subcontracting shown in Table 8.3. The second factor *Financial Support* accounts for 20.4 percent of the variance. This is derived from a combination of two variables: financial support (0.84) and provision of inputs and tools (0.73), reflecting limited access of SMEs to external financial sources. The third factor

Specialisation and Lower Transaction Costs explains 16.4 percent of the total variance. It is composed of two variables: lower costs associated with contracting and business (0.79) and specialisation (0.75).

8.3.2 Initiation of Subcontracting Linkages with Parent Firms

Our survey questioned sample SMEs on how they initiated subcontracting transactions with large-scale assembler firms. Table 8.5 indicates the number and share of metalworking and machinery SMEs that used each intermediary channel for the establishment of subcontracting relationships with main principal firms.

The sample SMEs relied significantly on personal linkages when they approached their main customers and started subcontracting transactions. More than 70 percent of the sample SMEs used relationships with family, relatives or friends to initiate contacts with parent firms and commence business with them. Most of the sample firms that utilised this personal channel said that they could not have started the subcontracting business successfully if they had contacted parent firms without any special recommendation from family, relatives or friends. These sample SMEs claimed that, without such informal or private intermediaries, it was difficult for small-medium producers to identify large-scale assembler firms with business opportunities and contact them.

Table 8.5 Intermediary Channels for the Commencement of Subcontracting Business with Main Parent Firms

Channels	*No. of Firms* [1] *and Rank*		*Differences between Groups in Firm Categories*		
	All (%)	*Rank*	*Size* [2] *p*-values	*Ethnicity* [3] *p*-values	*Subsector* [4] *p*-values
1. *Owners who Previously Worked for Parent Firm(s)*	11 (15.1)	4	0.77	0.02 * (+)	1.00
2. *Firms in Similar Business*	35 (47.9)	2	0.00 ** (+)	0.06	0.02 * (+)
3. *Traders or Trade Agents*	6 (8.2)	6	0.30	1.00	0.18
4. *Input Materials and Equipment Supplier Firms*	1 (1.4)	10	0.41	0.40	1.00
5. *NGOs*	5 (6.8)	7	0.15	0.01 ** (+)	0.32
6. *Industrial Associations, KADIN and Cooperatives*	10 (13.7)	5	0.56	0.18	0.44
7. *Government/Public Institutions*	2 (2.7)	8	0.12	0.15	0.46
8. *Family, Relatives and Friends*	52 (71.2)	1	0.39	0.00 ** (-)	1.00
9. *Banks/Financial Institutions*	2 (2.7)	8	0.10	0.51	1.00
10. *Own Efforts without Prior Relationships*	23 (31.5)	3	0.00 ** (-)	0.00 ** (-)	0.78
Number of Sample Firms	73				

Notes 1) Figures in the upper row indicate the number of firms which used each intermediary channel for the establishment of subcontracting ties with main parent firms. Figures in parentheses are the share of firms with each channel in the total sample firms.

2) Differences in frequency ratios between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by *p*-values of Pearson's chi-square test. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

3) Difference in frequency ratios between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by *p*-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

4) Difference in frequency ratios between firms engaged in the automobile/motorcycle subsector (AM) and the agricultural machinery/bicycle subsector (AB), which is indicated by *p*-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

Source: Based on author's interview and questionnaire survey during 1999-2000.

One non-*pribumi* parts supplier firm (*Firm S42*), which engages in stamping of seats and bodies for vehicles and welding and sub-assembling of mufflers for commercial trucks, kept close relationships with an automobile assembler firm (*Firm A01*) since the start of its operation in 1975. According to its current president, his father, the founder and former president, had an intimate personal friendship with the management of *Firm A01*. He was encouraged by *Firm A01* to change his original business from the micro-scale production of metal pallets for delivery to the commercial production of mufflers and seats for vehicles. After the establishment of *Firm S42*, the founder soon received a stable and reasonable amount of orders from *Firm A01* under subcontracting arrangements. Statistical tests in Table 8.5 show that non-*pribumi* SMEs took advantage of these personal connections more often than *pribumi* SMEs, reflecting the close networks that exist in the ethnic Chinese community in Indonesia.

About 15 percent of the firms in our survey reported that they successfully reached a subcontracting agreement because the owners previously worked for their current principal firms. For example, a former director of a foreign-affiliated automobile assembler firm (*Firm A05*) established his independent company (*Firm S11*) in Jakarta. His former position gave him good access to *Firm A05*. *Firm S11* easily commenced subcontracting business with the auto manufacturer and engaged in machining of cooling fans for vehicle engines and covers for cylinder heads. Similarly, the owner of *Firm S69* had a working experience at *Firm A10*, the agricultural machinery manufacturer in Surabaya, up to 1989. Soon after his retirement, he established an independent and small supplier firm in 1990 and started to receive orders for press parts from *Firm A10* under subcontracting arrangements.

Nearly half of the sample SMEs established their initial contacts with parent firms through peer firms in similar lines of business. *Firm S16* provided stamping work for automotive and motorcycle parts. A peer firm producing stamping dies introduced it to some automobile and motorcycle manufacturers. As a result, the small-scale press firm started direct business with some of the introduced assembler firms. In Table 8.5, Fisher's exact test indicates that assistance from similar firms in approaching large-scale assembler firms was more popular among smaller SMEs and those in the agricultural machinery and bicycle subsectors than larger SMEs and those in the automobile and motorcycle subsectors. This implies that SMEs in the former group rely more on cooperative relationships among themselves than the latter.

Industrial associations, chamber of commerce and industry (KADIN) and cooperatives were cited by only 14 percent of the SME respondents. Roughly 40 percent of the SMEs that used these collective channels raised national-level associations such as GIAMM (Indonesian Automotive Parts and Components Industries Association) and ASPEP (Association of Metalworks and Machinery) as intermediaries for the creation of initial opportunities to approach main parent firms. The remaining 60 percent stated local- and grass-roots-level organisations such as APIKS (Association of Small-scale Metalworking Industries in Sukabumi) and PT Usbersa Mitra Logam, which were already explained in Section 6.2.

Few other external channels were mentioned in our survey. Traders, input materials and equipment supplier firms, and financial institutions did not play a crucial role in connecting SMEs to LEs. NGOs have linked SMEs to large manufacturers in Indonesia, but the beneficiaries of their intermediary services are limited to certain SME groups, as noted in Section 6.3. Table 8.5 indicates that *pribumi* SMEs were the beneficiaries, not non-*pribumi* SMEs. It appears that the efforts by the Indonesian government in providing small-medium supplier firms with opportunities to establish subcontracting linkages with large assembler firms were largely unsuccessful.[5]

Approximately one third of the surveyed metalworking and machinery producers contacted main parent firms without prior direct or indirect relationships. Statistical tests shown in Table 8.5 reveal that smaller and *pribumi* SMEs established subcontracting linkages with main principal firms by their own effort less frequently than larger and non-*pribumi* counterparts. For example, a *pribumi* supplier firm (*Firm S66*) with only six employees has had only one parent firm since its establishment in 1980. The first and only subcontracting business was initiated through the intermediary of a close friend working at *Firm A10*, the non-affiliated Indonesian agricultural machinery manufacturer. Since the commencement of subcontracting with *Firm A10* in 1980, *Firm S66* has not succeeded in establishing subcontracting transactions with other principal firms. The current owner of *Firm S66* attributed the difficulty in approaching parent firms to a lack of personal linkages.

8.4 Types of Subcontracting Linkages with Parent Firms

As stated before, Lall (1980: 208-9, 213-22) identified ten categories of key linkages in his case study of two truck manufacturers with their parts supplier firms in India. This study raises 15 types of relationships with large-scale parent firms, which reflect our previous discussion in Chapter 2 and are listed in Table 8.1, and investigates the existence of these subcontracting linkages in the Indonesian metalworking and machinery industry.

[5] Chapter 6 observed that the Indonesian government did not significantly support metalworking and machinery SMEs in channelling them to potential markets including subcontracting business.

Table 8.6 Types and Utilisation of Subcontracting Linkages

Linkage Types	No. of User Firms [1] and Rank: All (%)	Rank	Differences between Groups in Firm Categories: Size [2] p-values	Ethnicity [3] p-values	Subsector [4] p-values
1. *Support of Establishment*	6 (8.2)	13	0.58	0.21	0.33
2. *Large/Stable Orders*	73 (100)	1	-	-	-
3. *Technical Specifications*	69 (94.5)	2	0.59	1.00	0.00 ** (-)
4. *Lending of Tools*	30 (41.1)	8	0.73	0.47	0.01 ** (-)
5. *Advice on Machinery*	14 (19.2)	11	0.13	0.22	0.10
6. *Provision of Used Machinery*	5 (6.8)	15	0.28	0.08	1.00
7. *QC Support*	65 (89.0)	3	0.59	0.71	0.00 ** (-)
8. *Production Technology Support*	59 (80.8)	4	0.00 ** (-)	0.00 ** (-)	0.01 ** (-)
9. *Joint Design*	10 (13.7)	12	0.04 * (-)	0.01 ** (-)	0.05 * (-)
10. *Managerial Support*	41 (56.2)	6	0.55	1.00	0.18
11. *Provision of Inputs*	31 (42.5)	7	0.10	0.23	0.01 ** (+)
12. *Provision of Credit/ Guarantees*	6 (8.2)	13	0.34	0.68	0.33
13. *Reasonable Payment Conditions*	18 (24.7)	9	0.77	0.78	0.06
14. *Price Negotiations*	58 (79.5)	5	0.13	0.04 * (-)	0.00 ** (-)
15. *Market Information*	16 (21.9)	10	0.65	0.15	0.33
Number of Sample Firms	73				

Notes: 1)Figures in the upper row indicate the number of firms which utilise each subcontracting linkage. Figures in parentheses are the share of firms with each linkage in the total sample.

2) Differences in frequency ratios between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by p-values of Pearson's chi-square test. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

3) Difference in frequency ratios between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by p-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

4) Difference in frequency ratios between firms engaged in the automobile/motorcycle subsector (AM) and the agricultural machinery/bicycle subsector (AB), which is indicated by p-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Table 8.6 shows the number and share of sample firms which have utilised each of the 15 linkages under subcontracting ties with large parent firms. All SMEs experienced large and/or stable orders provided by assembler firms under vertical inter-firm relationships, although the extent of benefits from this type of linkage varies according to economic conditions (e.g., high economic growth period, economic crisis period) and situations or characteristics of individual firms (e.g., firm size, ethnic affiliation of owners, and subsector), which will be explained in Section 8.5. In contrast, market information on potential products or customers was raised by only 20 percent of the SMEs. In an environment of imperfect information, even large-scale assembler firms tend to have insufficient market information outside their own organisations.

Firm S12, a leaf spring producer in Jakarta, has received a series of orders from several automobile manufacturers. It noted that such constant orders were an important factor for the stable growth of the company. According to a non-*pribumi* firm (*Firm S40*) producing disk wheels for medium- and large-sized vehicles in Surabaya, its main parent firm, a large automobile manufacturer (*Firm A01*), regularly issues 6-month order forecasts, which help Firm S40 stabilise operations. Another medium-scale firm (*Firm S25*), engaged in machining operations in Jakarta, receives three-year production forecasts by a foreign-affiliated motorcycle assembler firm (*Firm A08*).

Quality control (QC) support and production technology support were also very common linkages. QC support was utilised by nearly 90 percent of the surveyed SMEs and production technology support by more than 80 percent. The statistical tests in Table 8.6 indicate that differences in the share of SMEs with linkages of production technology support between groups in firm categories of size, ethnicity and subsector are significant at the 1 percent level. Similarly, the proportion of firms with linkages of

QC support is also statistically different between the two subsector groups at the 1 percent level. Larger SMEs, non-*pribumi* owners and firms producing automotive and motorcycle parts have developed such technological linkages with large-scale parent firms more than smaller SMEs, *pribumi* owners and firms producing agricultural machinery and bicycle parts. The former SME groups tend to seek technological interactions with LEs more strongly than the latter groups, while parent firms can establish closer and denser technical ties with the former groups than with the latter. This may reflect higher technical awareness and absorption capabilities of the former groups relative to the latter. In addition, assembler firms in the automobile and motorcycle subsectors generally have higher levels of technologies and, therefore, can more easily extend technical assistance including QC support to small-medium supplier firms than those in agricultural machinery and bicycle subsectors. Also, because of differences in the precision of final products, automotive and motorcycle parts and components need higher quality supported by higher technology than agricultural machinery and bicycle ones. Consequently, assembler firms in the automobile and motorcycle subsectors have to pay more attention to improvements in the quality and production technology of supplier firms than those in the agricultural machinery and bicycle subsectors.

An example is a larger SME (*Firm S05*), which engages in forging, stamping, machining and sub-assembling of automotive parts in Jakarta. It is technically audited once a year by several principal firms and has utilised this annual assessment as an opportunity to upgrade the levels of quality, technology and management. Under subcontracting ties with the largest auto manufacturer (*Firm A03*) in Indonesia, *Firm*

S05 has acquired the Toyota Production System (TPS) and has improved the quality of its products and its production systems as a whole.[6]

Another example is a press parts supplier firm (*Firm S09*) in Jakarta. It has learned Total Productive Maintenance (TPM) from the foreign-affiliated motorcycle assembler firm (*Firm A08*).[7] *Firm A08* offers training programs on TPM, by both inviting vendor firms to classroom lectures and dispatching TPM experts to the factories of supplier firms. As already explained in Chapter 6, *Firm A08* has also organised a plant-tour-type study program, which aims to let supplier firms pay a mutual visit in a group consisting of five local and five foreign-affiliated supplier firms, and to let them exchange ideas on how to improve the management capabilities of quality, technology and delivery time. *Firm S09* has gained much knowledge on quality and technology through these TPM training and plant-tour-type study programs.

Our survey observed the Purchased Input Concept Optimisation with Supplier (PICOS) program, which is a quality and productivity improvement program introduced by General Motors in the early 1990s to support auto parts supplier firms in upgrading capabilities of quality, technology and management. *Firm A18*, a U.S.-affiliated automobile manufacturer, extended a 16-step quality improvement program under the PICOS scheme to one of the larger subcontracting SMEs (*Firm S20*) producing press parts and components in Jakarta. This support from *Firm A18* enabled *Firm S20* to

[6] The Toyota Production System (TPS), which was originated and developed by Toyota Motor Company in Japan, is a technology of comprehensive production management that enabled Toyota and many other companies to achieve improvements in quality and productivity. TPS considers how to adapt production schedules to the demand changes in the market while pursuing the goals of low cost, high quality, timely delivery and improved worker morale. It is built on the "just-in-time (JIT)" production system, which means producing only necessary units in a necessary quantity at a necessary time. Under subcontracting relationships with *Firm A03*, *Firm S05* and many other supplier firms have a chance to improve their quality, productivity, technology, and production management through transfer of "TPS." For further details on the Toyota Production System, see Daimon (1998).

[7] Total Productive Maintenance (TPM) is a maintenance program which is carried out by all employees through small group activity and leads to the establishment of an efficient production system. The implementation of TPM results in increased productivity of the machinery and considerable cost savings through positive equipment maintenance activities that can realise easy, efficient and safe operation. See Nakajima (1994) and Takahashi and Osada (1990).

qualify for QS-9000 series in 1999 and to start, as a first-tier supplier firm, the supply of parts and components to *Firm A18*.[8] Subsequently, *Firm S20* began to give lectures on QS-9000 to around 15 second-tier subcontractors.

Under subcontracting ties, *Firm A05*, the foreign-affiliated automaker, has rendered opportunities for technical training to vendor firms. *Firm S11*, a small non-*pribumi* firm, often sent its engineers to *Firm A05* and let them learn advanced skills and technologies, especially when it had to handle unfamiliar machining processes. One small-scale second-tier SME (*Firm S46*) producing motorcycle stamping parts has also sent its staff members to training programs on production technology and the just-in-time system offered by a foreign-affiliated, large first-tier supplier firm (*Firm A17*). According to *Firm S46*, technical advice and guidance on dies-making given by *Firm A17*, a shock absorber manufacturer, are particularly beneficial.

Technical linkages through detailed specifications prevail in around 95 percent of the sample SMEs. However, the share of firms with technical specifications is significantly different at the 1 percent level between SMEs in the automobile and motorcycle subsectors and those in the agricultural machinery and bicycle subsectors. All of the SMEs in the former group have produced parts and components based on technical specifications, while less than 80 percent of SMEs in the latter group have referred to the specification documents and the remaining 20 percent have supplied their products and services without technical specifications. For example, *Firm S93*, a micro enterprise in Jakarta, produces press parts for bicycles without technical specification documents from assembler firms because the products are technologically

[8] The Quality System Requirements QS-9000 was developed by "Big 3" automobile manufacturers in the U.S. (i.e. General Motors, Ford and Chrysler), as a common supplier quality standard instead of their previous individual quality requirements. QS-9000 is based on ISO 9001 and consists of two sections: ISO-based quality requirements and customer-specific quality requirements.

simple and not required to be extremely precise. The small firm was also not accustomed to reading detailed technical documents.

Linkages of advice on the layout and selection of machinery/equipment and joint design were not very popular among our sample firms. Technical linkages through advice on machinery/equipment appeared in less than 20 percent of the sample SMEs, and those through joint design in only 14 percent. The former type of linkages does not often function well without finance for the purchase of recommended equipment, while the latter type generally requires higher technological capabilities of supplier firms. Also, compared with their headquarters or joint venture partners, foreign-affiliated assembler firms in Indonesia do not have an opportunity to develop new parts and components to be incorporated in their final products. Therefore, both types were not often mentioned as subcontracting linkages by our sample SMEs.

An example is a larger non-*pribumi* SME (*Firm S02*), which produces steel rims for vehicles. It has a research and development (R&D) division in its organisation. Engineers in this division have carried out product development activities jointly with *Firm A01*, the above-mentioned auto manufacturer. Similarly, *Firm S05*, which is a larger non-*pribumi* SME in Jakarta, has often conducted product design in cooperation with automobile assembler firms, particularly when new models (including minor changes) of cars were launched. Differences in the share of SMEs dealing with joint designs are statistically significant at the 1 to 5 percent level between groups in firm categories by size, ethnicity and subsector. None of the *pribumi* entrepreneurs and SMEs in the agricultural and bicycle subsectors has engaged in joint design and development. As explained above, SMEs in these groups did not have sufficient capabilities to handle this kind of high-level interaction with large-scale parent firms.

Support for managerial technology from large-scale parent firms was found in more than 55 percent of the sample SMEs. Differences in the share of establishments with managerial assistance are not statistically significant between groups in firm categories of size, ethnic affiliation of entrepreneurs and subsector. Many of the sample SMEs that experienced managerial assistance learned techniques of specific management areas such as quality, technology, production and maintenance from large-scale parent firms through subcontracting ties. For instance, the transfer of the 5S management approach was frequently observed as a form of managerial support.[9]

Under subcontracting ties, reasonable payment conditions for supplier firms such as downpayment and quick payment after delivery were arranged in a quarter of the sample SMEs. Raw materials, intermediate goods and tools (e.g., dies and molds) were supplied through subcontracting relationships to roughly two-fifths of our sample producers. These financial linkages can supplement shortages of working capital that SMEs often faced.

For example, a small-scale *pribumi* firm (*Firm S50*) in Jakarta engages in dies-making and machining mainly in the motorcycle subsector. Through subcontracting linkages with the largest motorcycle manufacturer (*Firm A16*) in Indonesia, *Firm S50* has often been offered frequent payment conditions: downpayment (30 percent of the total contract amount), progress payment (40 percent), payment on delivery (20 percent) and final payment after examination of products (10 percent). *Firm S93*, a small *pribumi* supplier firm producing washer rings for bicycles, has often received 20-30 percent of the contract amount as downpayment from assembler firms. This small enterprise is also given metal sheets as raw material for bicycle press parts through

[9] "5S" comes from the first letters of the Japanese terms for Organisation (Seiri), Neatness (Seiton), Cleaning (Seiso), Standardisation (Seiketsu) and Discipline (Shitsuke). The 5S's is the basic philosophy of factory management focusing on effective work place organisation and standardised work procedures. The 5S's simplifies the work environment and reduces waste and non-value activities while improving quality, productivity and safety. On the 5S concept, see Osada (1991).

subcontracting linkages with large-scale bicycle manufacturers. Dies for automotive and motorcycle press parts have been lent to *Firm S16* and *Firm S17*, both of which are small *pribumi* firms in Jakarta, under subcontracting transactions with large-scale parent firms. These two SMEs admitted that it was difficult for them to produce or purchase precise and expensive stamping dies for automotive and motorcycle parts without support from principal firms.

Statistical differences in the proportion of firms that were provided with support for input materials and tools appear between SMEs in the automobile and motorcycle subsectors and those in the agricultural machinery and bicycle subsectors. As illustrated above, raw materials and intermediate inputs are provided more frequently to SMEs producing agricultural machinery and bicycle parts than to their counterparts. By contrast, tools like dies and molds are lent to SMEs in the automobile and motorcycle subsectors more often than their counterparts. This contrast may largely be explained by differences in the sectoral characteristics. Compared with sample SMEs in the automobile and motorcycle subsectors, those in the agricultural machinery and bicycle subsectors often engage in simple metal processing services which include machining or electroplating of incomplete parts provided by parent firms. Also, the sample SMEs in the agricultural machinery and bicycle subsectors are financially weaker than their counterparts, and tend to face difficulties in purchasing materials by themselves, due to the lack of working capital.[10] On the other hand, SMEs in the automobile and motorcycle subsectors are often required to produce more precise parts and components,

[10] In general, less developed firms can more easily serve as vendor firms in the agricultural and bicycle subsectors than in the automobile and motorcycle subsectors, because, relative to the latter subsectors, the former subsectors are not likely to require supplier firms to carry out complicated production and business operations. In fact, among our respondents, there were more SMEs with lower technical, financial and other related capabilities in the agricultural machinery and bicycle subsectors than in the automobile and motorcycle subsectors.

compared to those in the agricultural machinery and bicycle subsectors. Production of more precise products requires precise and expensive tools like dies and molds.

Other types of financial linkages, which can alleviate the lack of investment capital, are less generally observed in subcontracting relationships. Credit/financial guarantees and second-hand machinery/equipment were provided to only a limited number of SMEs under subcontracting arrangements. Assistance in establishing firms through subcontracting relationships was rarely observed. *Firm S26* located in Jakarta is one of the exceptions. After working at the largest motorcycle assembler group in Indonesia (*Firm A16*) for 15 years, the owner of *Firm S26* left his job and founded his own firm.[11] Because of the close relations between the motorcycle principal firm and the former employee, the assembler firm guaranteed long-term contracts to *Firm S26*. Accordingly, *Firm S26* performed well since its establishment in 1985, mainly serving *Firm A16* as a supplier of parts and components. Another exceptional case was *Firm S06*, which is located in Jakarta and produces brake drums and brake hubs for vehicles. *Firm S06* was established in 1986 through joint investment by a local conglomerate group and *Firm A01* (the foreign-affiliated automaker). Most of the machinery and equipment in the factory of *Firm S06* were purchased with credit from *Firm A01*. However, this case is an exception. The provision of credit/financial guarantees and support for the establishment of supplier firms under vertical inter-firm linkages were reported by only 8 percent of the surveyed firms. As previously explained, without the equivalent of vertical *keiretsu* groups and in an environment with imperfect information, it is not easy for principal firms to provide SMEs with capital.

[11] *Firm S26* has, in turn, allowed its employees to leave and establish new enterprises which can serve it as supplier firms. It has provided such spin-off supplier firms with various kinds of assistance including technical, managerial, marketing and financial support. Sato (1998a: 134-7) discussed the details of *Firm S26* for the development of its own vendor firms.

Nearly 80 percent of the sample SMEs have had opportunities to negotiate prices with parent firms for their products and services based on a cost breakdown. The proportion of SMEs that have experienced price negotiations is significantly different between groups in firm categories by ethnic affiliation and subsector. Open discussion of price levels with parent firms is more popular among SMEs in the automobile and motorcycle subsectors than in their counterpart subsectors. This reflects differences in the extent of modernisation and financial strength between automobile and motorcycle assembler firms and agricultural machinery and bicycle counterpart firms.

Our interview survey found several cases where, after price negotiation between the two parties, prices were not necessarily set based on a cost breakdown, particularly during the recent crisis period. For example, *Firm S05*, a larger non-*pribumi* auto parts SME, stated that one large-scale automobile assembler firm as its main customer sometimes required it to reduce prices to such low levels that it could not cover even the cost of its products at the height of the 1997-98 economic crisis. In this case, subcontracting linkages with *Firm S05* function as a shock absorber for the parent firm. This will be observed in more detail in Chapter 9. However, *Firm S05* added that, in the years up to the late 1997, prices were occasionally set at levels that contained sufficient profit after discussion with the parent firm.

8.5 Costs of and Benefits from Subcontracting Linkages with Parent Firms

The second half of this section will indicate that SMEs have obtained several kinds of benefits through subcontracting linkages with LEs. The promotion of beneficial subcontracting relations may facilitate the further development of SMEs. Together with benefits, however, it is also necessary to probe the costs that SMEs have to bear in subcontracting transactions. This section, therefore, examines both the costs of and benefits from subcontracting ties with LEs from the point of view of small-medium supplier firms. An explanation of cost and benefit items can be found in Table 8.1.

8.5.1 Costs Associated with Subcontracting Linkages with Parent Firms

Table 8.7 shows the extent of costs associated with subcontracting business and the differences of such burdens between firm categories. High quality levels of products required by parent firms were rated at the highest average score of 4.32 among 13 kinds of costs listed in the table. It is apparently difficult for the small-medium producers to satisfy the levels of product quality required by large-scale assembler firms. Statistical tests show differences in mean scores between *pribumi* and non-*pribumi* entrepreneurs. Several *pribumi* owners mentioned that they are not accustomed to paying much attention to the quality of their products and, therefore, need to make greater efforts to achieve the required product quality than non-*pribumi* counterparts.

Firm S16 and *Firm 17* are both small-scale *pribumi* press parts supplier firms. They provided examples of the burdens on SMEs associated with a need to satisfy product quality. Evaluation sheets on quality and delivery time are sent every three months by a foreign-affiliated motorcycle manufacturer (*Firm A07*) to *Firm S16*. Similarly, *Firm S17* was assessed regularly by *Firm A08*, the large-scale motorcycle assembler firm, from the viewpoint of quality and delivery timing. Although the two supplier firms felt that such periodical audit programs were useful, they acknowledged at the same time that these required them to spend a large amount of resources to maintain and further upgrade the levels of product quality and delivery time.

Table 8.7 Costs of Subcontracting Transactions with Parent Firms

Costs	Mean Scores 1) and Rank		Differences between Groups in Firm Categories		
	All (s.d.)	Rank	Size 2) F-values	Ethnicity 3) t-values	Subsector 4) t-values
1. *Initial Finding of Parent Firms*	3.45 (0.75)	7	5.45 ** (+)	2.63 ** (+)	1.59
2. *Competition*	3.53 (0.63)	6	3.06 * (+)	2.59 ** (+)	1.66
3. *Small Markets*	3.68 (0.62)	5	1.00	1.25	0.85
4. *Penalty*	2.79 (0.64)	12	8.72 ** (+)	1.88	3.53 ** (+)
5. *Quick Response*	3.23 (0.64)	10	2.09	0.81	1.96 * (+)
6. *Shift of Loss*	3.10 (0.69)	11	7.57 ** (+)	2.52 ** (+)	3.38 ** (+)
7. *High Quality*	4.32 (0.72)	1	2.39	2.34 * (+)	1.87
8. *High Technology*	4.00 (0.80)	2	2.21	0.60	1.00
9. *Low Prices*	3.99 (0.70)	3	0.69	0.89	0.08
10. *Strict Delivery Timing*	3.89 (0.76)	4	2.80 * (+)	2.34 * (+)	0.38
11. *Large Production Capacity*	3.26 (0.58)	9	4.74 ** (-)	1.92	1.95
12. *Expensive Input Materials*	3.34 (0.65)	8	0.31	0.39	0.62
13. *R&D*	1.68 (0.98)	13	10.74 ** (-)	3.69 ** (-)	2.99 ** (-)
Number of Sample Firms	73				

Notes: 1) Figures in the upper row are the average of scores indicated by firms' rating from 1 (the lowest score as very small) to 5 (the highest score as very large).

2) Differences in mean scores between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by *F*-values of ANOVA. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

3) Difference in mean scores between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by the *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

4) Difference in mean scores between firms engaged in the automobile/motorcycle subsector (AM) and the agricultural machinery/bicycle subsector (AB), which is indicated by the *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Levels of production technologies required were ranked the second highest, with an average score of 4.00. The costs for meeting the high levels of technologies requested by large parent firms are substantial for the sample small-medium enterprises. For example, *Firm S11*, a small-scale non-*pribumi* firm, has supplied very precise products such as crankshafts, cooling fans of engine hubs and cylinder head covers to *Firm A05*, the auto manufacturer. To process these precision parts, *Firm S11* has to adopt the CPMFG processing method, which involves highly advanced machining technology and requires the firm to make great efforts to master it, despite the fact that *Firm A05* extends technical support.

The sample firms assigned a high average score of 3.99 to low prices of parts and components they produced.[12] Low prices requested by parent firms are clearly perceived as a heavy burden on SMEs in subcontracting relations. For example, a small-scale electroplating firm (*Firm S75*) in Surabaya mentioned that it was sometimes requested by parent firms to accept low prices without consideration, even though the two parties had previously discussed price levels based on cost breakdowns.

Strict delivery timing was also cited as a significant cost in subcontracting transactions, with an average rating of 3.89. This burden was already observed above in the cases of *Firm S16* and *Firm S17*, both of which were under pressure to keep strict delivery schedules through periodical audit programs by principal firms. A non-*pribumi* auto parts supplier firm (*Firm S07*) pointed out that vendor firms needed to have a 3-month stock of raw materials to assist assembler firms in implementing the just-in-time (JIT) system. Firm S07 mentioned that automobile manufacturers instructed supplier firms to adopt the just-in-time delivery method in production processes of supplier firms themselves. However, it is very difficult in practice for

[12] Low prices here mean price levels lower than cost plus minimum margin for products produced by supplier firms.

Firm S07 to reduce the amount of stock in its workshops of vendor firms, because domestic upstream industries such as the iron and steel, the non-ferrous metal and the basic chemical industries are not well-developed in Indonesia and their produce cannot be purchased in a timely fashion. Differences in average scores of delivery time were statistically significant at the 5 percent level between groups in size and ethnic categories. Smaller SMEs and *pribumi* owners felt the difficulties in delivering their products on time more strongly than their counterparts. Relative to the latter groups, the former groups may not be familiar with the importance of delivery timing. They therefore perceive it as a burden.

The next group of burdens associated with subcontracting concerns market-related issues. Small markets and severe competition in the market were rated high at average scores of 3.68 and 3.53, respectively.[13] Initial finding of parent firms was also given a high average score of 3.45. *Firm S20*, a larger and first-tier SME in Jakarta, stated that the small market size of the Indonesian automobile industry limited the opportunities of fostering small-medium supplier firms. As a consequence of the relatively small demand for vehicles, assembler firms cannot contract out a large amount of parts and components and thus SMEs are not able to expand their manufacturing operations. *Firm S20* pointed out that, for auto parts producers, the after-market (spot-basis replacement parts market) has been larger than the subcontracting market.

Similarly, a non-*pribumi* bicycle parts supplier firm (*Firm S86*) in Surabaya mentioned that the spot-basis replacement parts market for bicycles in Indonesia is a

[13] The small size of markets for the related subsectors was observed in Section 5.5. Parts and components produced by Indonesian small-medium supplier firms in these subsectors have not been competitive in terms of quality and prices in the international market. Also, different from some other Asian economies such as Taiwan, trade policies in Indonesia have been biased against SMEs (Hill 2001: 253). These factors keep SMEs in the subsectors inward-looking for a long time and prevent them from being involved in international subcontracting linkages that may enlarge their markets and also encourage them to improve the quality of products further.

larger source of demand than the subcontracting market. Different from the latter market, the former does not require high quality, high technology and strict delivery timing. *Firm S86* indicated that the smaller subcontracting market made severe requirements concerning quality and delivery time very costly. A small-scale *pribumi* firm (*Firm S41*) in Jakarta explained that competition in terms of price, quality and services was quite strong among SMEs producing non-precision-type press parts for automobile and motorcycle assembler firms, because of the limited volume of demand and the existence of many similar supplier firms. Also, *Firm S24*, a small-scale *pribumi* press parts supplier firm in Jakarta, stated that it is costly to initially approach automobile and motorcycle manufacturers as potential buyers. As described before, it is not easy for SMEs to start subcontracting business with large parent firms without references through inter-personal or inter-firm relationships.

In short, SMEs in Indonesia have to compete with rival enterprises in finding and maintaining customers in a relatively small market. Statistical tests show that average scores of competition and the finding of parent firms were significantly different at the 1 to 5 percent level between groups in firm categories of size and ethnic affiliation. The burden of competition and finding potential clients was relatively more costly for smaller firms and *pribumi* entrepreneurs than their counterparts. These differences seem to reflect the situation, in which smaller and *pribumi* SMEs have fewer resources that can be allocated to marketing activities, compared with larger and non-*pribumi* SMEs.

Quick response to requirements or claims from parent firms, shift of loss from parent firms to SMEs, and penalties due to incomplete fulfilment of contracts were rated at average scores of 3.23, 3.10, and 2.79, respectively. Differences in average ratings of these costs between groups in firm categories were statistically significant at the 1 to 5 percent level. Smaller SMEs, *pribumi* owners and firms in the agricultural machinery and bicycle subsectors tend to suffer from shift of loss more seriously than their counterparts. Difficulties in quickly responding to requirements from large-scale parent firms are more severe for SMEs producing agricultural machinery and bicycle parts than for those manufacturing automotive and motorcycle parts. Smaller SMEs and firms in the agricultural and bicycle subsectors see penalties for incomplete contracts as a greater burden than their counterparts. These differences reveal that, relative to their counterparts, smaller SMEs, *pribumi* SMEs and SMEs in the agricultural machinery and bicycle subsectors have only limited corporate strength to protect themselves from unfavourable market conditions and do not understand the business culture or customs of large-scale assembler firms.

Capital requirements are not negligible burdens for SMEs that intend to develop subcontracting relationships. The procurement of expensive materials and preparations to increase production capacity have been regarded as significant costs, with average scores of 3.34 and 3.26, respectively. *Firm S04*, a non-*pribumi* supplier firm, struggled with expensive raw materials for automotive muffler production. According to the muffler producer, the high-cost of inputs has resulted largely from heavy reliance on imported raw materials, particularly metal sheets of specific thickness, due to the underdevelopment of domestic upstream industries. *Firm S09*, a larger press SME, was instructed by two major motorcycle assembler firms (*Firm A08* and *Firm A16*) to have different types of production (press/stamping) lines for each of the two from those for others in the factory.[14] As a consequence of these requests, *Firm S09* had to build three separate production lines. The statistical tests show that larger SMEs recognise investment in production facilities as a greater burden than smaller SMEs.

[14] These two motorcycle manufacturers, respectively, intended not to safeguard their technologies but to have different types of press operations. This kind of requirement is not common among our sample SMEs.

R&D expenses were ranked the lowest, with an average score 1.68. Only a limited number of sample firms such as *Firm S02*, *Firm S05* and *Firm S20*, three of which are larger non-*pribumi* SMEs in the automobile and motorcycle subsectors, allocated budget and engineers to R&D activities. Mean scores of costs for R&D between groups in all of the firm categories are significantly different at the 1 percent level. Larger SMEs, non-*pribumi* entrepreneurs and producers in the automobile and motorcycle subsectors regard R&D costs more as a burden than their counterparts. However, in comparison with other cost items stated above, R&D expenditure is perceived as less of a burden by SMEs that conduct subcontracting business. This finding implies that subcontracting linkages provide SMEs with an opportunity to avoid internalisation of R&D activities. The absence of a need to internalise R&D activities does not only reduce costs but is also a benefit that subcontracting linkages at the current stage of industrial and SME development in Indonesia can provide.

Using factor analysis, three principal factors are extracted from the 13 cost variables observed above. The results are shown in Table 8.8. The three factors account for 65.3 percent of the total variance. The first factor explains 32.4 percent of the total variance and can be labelled as *Difficult Market Conditions*. This factor consists of six variables: competition in the market (with a factor loading of 0.86), shift of loss (0.85), quick response (0.80), initial finding of parent firms (0.74), small markets (0.71), and penalty (0.67).

The second factor accounts for 19.8 percent of the total variance and can be referred to as *QCD*. It is composed of variables of strict delivery timing (0.87), high technology (0.87), high quality (0.84), and low prices (0.48). These items correspond to three pillars of the manufacturing philosophy: quality, costs and delivery. The last factor explains 13.1 percent of the total variance. It is characterised as *High Capital*

Requirement and comprised of three variables: large production capacity (0.90), expensive input materials (0.86), and R&D (0.50).

Table 8.8 Matrix of Factor Loadings: Costs of Subcontracting Transactions with Parent Firms

Cost Variables	*Factor 1* *Difficult Market Conditions*	*Factor 2* *QCD (Quality, Cost and Delivery)*	*Factor 3* *High Capital Requirement*
1. *Competition*	0.86		
2. *Shift of Loss*	0.85		
3. *Quick Response*	0.80		
4. *Initial Finding of Parent Firms*	0.74		
5. *Small Markets*	0.71		
6. *Penalty*	0.67		
7. *Strict Delivery Timing*		0.87	
8. *High Technology*		0.87	
9. *High Quality*		0.84	
10. *Low Prices*		0.48	
11. *Large Production Capacity*			0.90
12. *Expensive Input Materials*			0.86
13. *R&D*	0.49		0.50
Eigen Value	4.21	2.57	1.71
Percentage of Variance Explained (%)	32.4	19.8	13.1
Cumulative Percentage (%)	32.4	52.2	65.3
Number of Sample Firms = 73			

Note: Loading values are not listed if they are smaller than 0.40.
Source: Based on author's interview and questionnaire survey during 1999-2000.

8.5.2 Benefits Obtained from Subcontracting Linkages with Parent Firms

The reasons why SMEs sought to establish vertical inter-firm relationships with large-scale parent firms were analysed in Section 8.3. Besides the motivations, this chapter examines revealed benefits to SMEs from subcontracting transactions with large-scale assembler firms in the automobile, motorcycle, agricultural machinery and bicycle subsectors.

Table 8.9 represents the benefits that the sample SMEs obtained from subcontracting linkages with parent firms. It also displays differences in mean scores between firms grouped in three categories, and the difference in mean scores between motivations for and actual benefits from subcontracting transactions. The comparison of Table 8.3 and Table 8.9 indicates that corresponding items of motivations and actual benefits ranked in almost same order. However, the results of paired-samples *t*-test in Table 8.9 indicate that mean scores of actual gains from subcontracting linkages were lower than those of motivations for subcontracting transactions. These differences in all items reveal that subcontracting ties with large-scale parent firms did not generally generate the benefits to the expected degree. Costs associated with vertical inter-firm linkages, which were observed above, are likely to reduce expected benefits of subcontracting cooperation. Yet, as indicated in Table 8.9, the sample SMEs acknowledged that they still obtained substantial benefits from subcontracting relationships with principal firms.

Table 8.9 Revealed Benefits from Subcontracting Transactions with Parent Firms

Revealed Benefits	*Mean Scores* [1] *and Rank* All (s.d.)	Rank	*Differences between Groups in Firm Categories* *Size* [2] F-values	*Ethnicity* [3] t-values	*Subsector* [4] t-values	*Difference Motivations and Actual* [5] t-values
1. *Lower Costs associated with Contracting/Business*	2.73 (0.84)	3	2.15	0.55	1.88	4.46 ** (+)
2. *Technical Support*	3.21 (1.21)	2	4.42 ** (-)	3.37 ** (-)	3.26 ** (-)	7.02 ** (+)
3. *Managerial Support*	2.38 (1.49)	5	1.50	1.38	1.69	2.56 ** (+)
4. *Provision of Large/Stable Orders*	3.79 (1.11)	1	1.33	2.97 ** (-)	2.26 * (-)	6.82 ** (+)
5. *Financial Support (except for 6. below)*	1.41 (0.74)	7	1.23	1.32	0.07	7.99 ** (+)
6. *Provision of Inputs and Tools*	1.62 (0.84)	6	1.35	1.76	1.69	5.87 ** (+)
7. *Specialisation*	2.73 (0.80)	3	0.86	0.58	1.61	2.32 * (+)
Number of Firms	73					

Notes: 1) Figures in the upper row are the average of scores indicated by firms' rating from 1 (the lowest score as not at all beneficial) to 5 (the highest score as very beneficial). Figures in parentheses are standard deviation.

2) Differences in mean scores between firms with 1-19, 20-49, 50-99, and 100-299 workers, which are indicated by F-values of ANOVA. ** = significant at the 1 % level, * = significant at the 5 % level. When the differences are significant, (+) = smaller SMEs > larger SMEs, (-) = smaller SMEs < larger SMEs.

3) Difference in mean scores between firms of *pribumi* owners (P) and non-*pribumi* owners (NP), which is indicated by the t-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = P SMEs > NP SMEs, (-) = P SMEs < NP SMEs.

4) Difference in mean scores between firms engaged in the automobile/motorcycle subsector (AM) and the agricultural machinery and bicycle subsector (AB), which is indicated by the t-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB SMEs > AM SMEs, (-) = AB SMEs < AM SMEs.

5) Difference in mean scores between motivations (Table 8.2) for and revealed benefits (this table) from subcontracting transactions with parent firms, which is indicated by the t-values of paired-samples t-test. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = motivations > revealed benefits, (-) = motivations < revealed benefits.

Source: Based on author's interview and questionnaire survey during 1999-2000.

Provision of large and/or stable orders was rated at the highest average score of 3.79. The SMEs we surveyed evaluated market provision as the most beneficial function in subcontracting linkages.[15] Consistent with its expectation, *Firm S85*, the bicycle parts supplier firm in Surabaya, highly appreciated the role of subcontracting relations in ensuring substantial and stable orders. During the crisis of 1997-98, orders from the spot market decreased sharply, while those from *Firm A12*, an export-oriented bicycle assembler firm, through subcontracting linkages remained constant. In 1998, *Firm S12*, a leaf spring producer in Jakarta, successfully found three new parent firms that offered orders with reasonable unit prices under subcontracting transactions. However, *Firm S12* noted that subcontracting linkages did not fully shield it from the decline of orders as a whole during 1997-1998.

The mean scores of large and stable orders are statistically different between groups in ethnic and sectoral categories. Non-*pribumi* SMEs and those in the automobile and motorcycle subsectors appreciated the market function embedded in subcontracting relationships more highly than their counterparts. It is possible that, as the above-mentioned *Firm S85* exploited the opportunity to start subcontracting with *Firm A12* through ethnic channels in the Indonesian Chinese network, strong inter-personal connections among Chinese entrepreneurs play a role in securing larger or stable orders. Also, differences in the size of the market between the automobile and motorcycle subsectors and the agricultural machinery and bicycle subsectors may explain differences in the evaluation of subcontracting linkages in terms of market creation and stability between SMEs in the two subsectors.[16]

---

[15] Table 5.2 identified market access and competition in markets as the main problems our sample SMEs faced. Tybout (2000: 17-8) also raised substantial uncertainty about future demand conditions as one of the main obstacles to the growth of SMEs. Therefore, the function of providing a stable market through subcontracting linkages is very helpful to SMEs.

[16] For difference in the scale of output between the two subsector groups, see Section 6.3.

Technical support was ranked the second highest, with an average score of 3.21. Under subcontracting relationships, *Firm S85*, a non-*pribumi* bicycle parts supplier firm, has received valuable technical guidance from *Firm A12*. Technical support through the frequent dispatch of engineers from the assembler firm enabled *Firm S85* to improve product quality and produce press parts used in bicycles for export to Europe. Owners of *Firm S45* and *Firm S51* resigned *Firm S26*, a first-tier supplier firm in the automobile and motorcycle subsectors, and started their operations as second-tier supplier firms. Through training programs and expert dispatch arranged by *Firm S26*, these two small-scale producers have learned how to make and repair dies, which is the most important technology for press stamping firms. *Firm S09*, a larger press parts supplier, and many other sample supplier firms acknowledged that TPM (Total Productive Maintenance) taught by *Firm A08*, a major motorcycle manufacturer in Indonesia, was a valuable management technique. They stated that transfer of TPM technology from *Firm A08* through subcontracting improved their productivity, product quality and other capabilities. However, a larger non-*pribumi* SME (*Firm S39*) in Surabaya pointed out that, in the context of Indonesian economy or developing economies, supplier firms could not always rely on technological support from assembler firms. According to *Firm S39*, which produces leaf and coil springs for automobiles and motorcycles, even large-scale or foreign-affiliated parent firms in Indonesia do not necessarily have sufficient expertise in every technological field.

Statistical tests reveal that mean scores are significantly different between groups in size, ethnicity and subsector categories. Larger SMEs, non-*pribumi* owners and firms in the automobile and motorcycle subsectors tend to evaluate benefits of technical assistance through subcontracting linkages more positively than smaller SMEs, *pribumi* owners and firms in the agricultural machinery and bicycle subsectors. These differences imply that the former SME groups are better able to absorb production technologies and related skills than the latter. Also, based on our interviews with assembler firms, in comparison with parent firms in the agricultural machinery and bicycle industry, those in the automobile and motorcycle industry have sufficient technological expertise and are capable of providing SMEs with useful information and know-how related to production technologies.

Transfer of managerial technologies through vertical inter-firm relationships was rated at 2.38 on average. In comparison to other forms of assistance, except for financial support, managerial support through subcontracting relations was not highly beneficial to our sample SMEs. However, *Firm S45* and *Firm S51* positively evaluated the role of subcontracting linkages in improving capabilities in the area of corporate management. *Firm S11*, a small non-*pribumi* SME, also valued managerial guidance provided by *Firm A05*, an automobile manufacturer, particularly in the field of factory management and labour management.

Benefits of lower costs associated with contracting/business and specialisation in certain production processes were ranked third, both with average scores of 2.73. Subcontracting linkages have played a moderate role in promoting the reduction of transaction costs and specialisation in certain products and services. For these benefits, there is no statistical difference in average scores between groups in firm categories of size, ethnic affiliation and subsector. Through subcontracting, the sample SMEs have reduced transaction costs and improved factor allocation in the process of specialisation.

Firm S11, a small non-*pribumi* precision machining firm in Jakarta, identified the lower cost of collecting information as one of the significant advantages generated by subcontracting linkages. This auto parts supplier firm has been able to make business plans for investment and human resource development without an extensive effort to collect necessary information, because *Firm A05*, a large automobile manufacturer and its main parent firm, has provided it with medium- to long-term future production plans together with monthly orders. Another small non-*pribumi* firm (*Firm S77*), which deals with machining, stamping and plating of agricultural machinery parts in Jakarta, explained that in the case of subcontracting business, it did not need to be concerned about opportunistic behaviour of customers (e.g., sudden cancellation of orders, unreasonable reduction of the contracted amount, and delay or evasion of payment). According to *Firm S77*, subcontracting can allow it to avoid the costs caused by opportunistic behaviour of another party in one-off exchanges with unfamiliar clients

Firm S40, an automotive parts supplier firm, mentioned that subcontracting arrangements allowed it to economise various costs including time. *Firm S40* in Surabaya and its principal firms in Jakarta communicate a range of business issues such as minor changes of quantity and delivery timing, simply by telephone rather than through direct visits and immediate modifications of contracts in writing. *Firm S40* also indicated that its specialisation in disk wheels for vehicles enabled it to pursue economies of scale and a better allocation of production factors. *Firm S75*, a small firm in the agricultural machinery subsector, is engaged in electroplating, which is a part of the process of the production of parts and components. It does not sell its products to retailers or wholesalers in the general market. This supplier firm pointed out that subcontracting allowed it to concentrate on electroplating services that can only be sold to specific companies. Through specialisation, it could utilise its limited financial and human resources more efficiently.

Financial support and the provision of input materials were given low average scores of 1.41 and 1.62, respectively. These low scores, in addition to the results of available linkages shown in Table 8.6, indicate that current subcontracting linkages have not extended sufficient financial support to the sample SMEs. In particular, credit and financial guarantees have not often been extended to small-medium firms through subcontracting. Cheap and long-term credits for investment capital from its parent firm (*Firm A01*) have been available to *Firm S06*, the brake drum and brake hub supplier firm. However, this is one of the exceptions. In our survey, subcontracting cooperation in financial matters did not go beyond establishing better payment conditions and providing raw materials/intermediate inputs and tools. As previously explained, principal firms cannot easily provide their supplier firms with financial assistance, because even the former group often faces financial difficulties and does not necessarily have sufficient information on the latter group.

Table 8.10 groups the above benefits from subcontracting transactions into three major factors, on the basis of factor analysis. These three factors can explain 81.3 percent of the total variance. The first factor accounts for 39.8 percent of the variance and is made up of the following three variables: technical support (with a factor loading of 0.88), managerial support (0.87), and provision of large/stable market (0.64). This dimension can be referred to as *Technical and Marketing Support*, because it contains variables related to supportive linkages in the fields of production technologies, managerial technologies and market creation.

The second factor explains 22.1 percent of the total variance and consists of two variables of specialisation (0.94) and lower costs associated with contracting and business (0.88). This factor represents benefits of *Specialisation and Lower Transaction Costs*. Finally, the third factor accounts for 19.4 percent of total variance and consists of the two variables of provision of inputs and tools (0.95) and financial support (0.92), which is characterised as *Financial Support*.

Table 8.10 Matrix of Factor Loadings: Revealed Benefits from Subcontracting Transactions with Parent Firms

Revealed Benefit Variables	*Factor 1* *Technical and Marketing Support*	*Factor 2* *Specialization and Lower Transaction Costs*	*Factor 3* *Financial Support*
1. *Technical Support*	0.88		
2. *Managerial Support*	0.87		
3. *Provision of Large/Stable Orders*	0.64	0.42	
4. *Specialisation*		0.94	
5. *Lower Costs associated with Contracting and Business*		0.88	
6. *Provision of Inputs and Tools*			0.95
7. *Financial Support*			0.92
Eigen Value	2.79	1.55	1.36
Percentage of Variance Explained (%)	39.8	22.1	19.4
Cumulative Percentage (%)	39.8	61.9	81.3
Number of Sample Firms = 73			

Note: Loading values are not listed if they are smaller than 0.40.
Source: Based on author's interview and questionnaire survey during 1999-2000.

8.6 Elements for the Better Functioning of Subcontracting Linkages

This section investigates basic elements for the better functioning of subcontracting cooperation. In addition to the three firm categories of size, ethnicity and subsector, several other elements to be explained below are introduced as variables which may potentially improve the functioning of subcontracting linkages with large-scale principal firms.

8.6.1 Elements for the Functioning of Subcontracting Linkages: Overall Benefits

On the basis of the results of Chapter 7 and previous studies (Baranson 1967; Berry 1997; Lall 1980; and Odaka 1983), ten variables (including size, ethnic affiliation and subsector) are identified as elements that would have effects on the extent of benefits from subcontracting transactions. Included are educational levels of owners and workers, past working experiences of owners, business continuity, trust, financial access and location. These explanatory variables in this study were defined in the following way:

1) *Education* (*owners*): educational levels of owners (0 = owners with senior high school or less education, 1 = owners with university education);
2) *Education* (*workers*): educational level of skilled workers (0 = firms in which average educational level of skilled workers is senior high school education or less, 1 = firms in which average educational level of skilled workers is university education including D3 (polytechnic) level);
3) *Experience* (*owners*): owners' working experience in similar business before taking their current position (0 = owners with no experience, 1 = owners with experience);
4) *Business Continuity*: duration of subcontracting business with major parent firms (1 = 0-1 year, 2 = 1-3 years, 3 = 3-5 years, 4 = 5-7 years, 5 = 7 and more years);
5) *Trust*: the degree of trust of our sample firms in their parent firms in terms of business and cooperation relations, indicated by a rating from 1 (the lowest score as little trustworthy) to 5 (the highest score as very trustworthy);

6) *Financial Access*: access to external financing sources before the 1997-98 crisis as indicated by sample firms' rating from 1 (the lowest score as very bad) to 5 (the highest score as very good); and

7) *Location*: location of sample SMEs (1 = firms located in rural areas, 2 = firms located in boundaries between urban and rural areas, and 3 = firms located in urban areas).

Factor scores of *Technical and Marketing Support*, *Specialisation and Lower Transaction Costs*, and *Financial Support* were extracted in Table 8.10 as the combined indicators of benefits from subcontracting. After reliability tests by the Cronbach coefficients, the three factor scores were used as dependent variables in a multivariate analysis of variance (MANOVA) to examine which elements have significant effects on the overall benefits from subcontracting linkages. The results of MANOVA in Table 8.11 reveal that all of the independent variables listed influence the functioning of subcontracting transactions but not to the same degree.

Overall benefits of *Technical and Marketing Support*, *Specialisation and Lower Transaction Costs*, and *Financial Support* through subcontracting linkages are influenced by ethnicity, subsector and trust of small-medium supplier firms in large parent firms. Differences in average scores of a linear combination of *Technical and Marketing Support*, *Specialisation and Lower Transaction Costs*, and *Financial Support* are statistically significant at the 1 percent level between groups in each firm category of ethnic affiliation of owners, subsector of SMEs, the degree of trust, and firm location. The results of MANOVA indicate that SMEs managed by non-*pribumi* owners, those engaged in the automobile and motorcycle subsectors, those with stronger trust, and those located in urban areas draw greater benefits from subcontracting linkages than their counterparts SMEs.

Table 8.11 Effects of Elements on the Overall Benefits from and Technical and Marketing Support through Subcontracting Transactions with Parent Firms

Elements	*Multivariate Test* (*Overall Benefits*)[1] MANOVA		*Univariate Tests* (*Technical and Marketing Support*)[2]	
	MANOVA		*ANOVA*	t-tests
	Wilks' Lambda	F-values[3]	F-values[3]	t-values[3]
1. *Size*	0.78	1.99 *	3.33 *	
2. *Ethnicity*	0.80	5.66 **		3.38 **
3. *Subsector*	0.83	4.66 **		2.86 **
4. *Education (owners)*	0.87	3.45 *		2.82 **
5. *Education (workers)*	0.91	2.23 +		2.61 **
6. *Experience (owners)*	0.91	2.23 +		2.18 *
7. *Business Continuity*	0.76	1.58 +	2.88 *	
8. *Trust*	0.46	4.96 **	5.00 **	
9. *Financial Access*	0.75	1.70 +	1.75	
10. *Location*	0.78	3.07 **	3.43 *	
Number of Sample Firms = 73				

Notes: 1) Factor scores of *Technical and Marketing Support*, *Specialisation and Lower Transaction Costs*, and *Financial Support*, which are extracted from factor analysis in Table 8.10, are used as multiple dependent variables in these multivariate tests.

2) Factor scores of only *Technical and Marketing Support*, which are extracted from factor analysis in Table 8.10, are used as a dependent (or test) variable in these ANOVA and t-tests.

3) ** = significant at the 1 % level, * = significant at the 5 % level, + = significant at the 10 % level.

Source: Based on author's interview and questionnaire survey during 1999-2000.

As already discussed above, non-*pribumi* SMEs can generally take advantage of subcontracting linkages more effectively than their *pribumi* counterparts, and parent firms in the automobile and motorcycle subsectors tend to have more capabilities to extend various kinds of support to supplier firms than those in the agricultural machinery and bicycle subsectors. Urban SMEs may be able to more effectively utilise subcontracting linkages under the conditions of better industrial infrastructure and proximity to input and output markets. Particularly interesting is the significant effect of trust of SMEs in LEs. Stronger trust in parent firms may encourage supplier firms to acquire many things from them through subcontracting ties.

Table 8.11 also shows that the overall benefits from subcontracting transactions are different at the 5 percent level between groups in firm size and owner education. Larger SMEs and those managed by owners with higher-level education can take advantage of subcontracting linkages more effectively than smaller SMEs and those run by owners with lower-level education. The remaining variables, worker education, experiences of owners, business continuity, and financial access, have a positive effect to some extent on the overall benefits from subcontracting transactions. Subcontracting linkages are likely to be more beneficial to SMEs with a higher level of education of skilled workers, those with owners' job experiences in similar business lines, those with longer relationships with parent firms, and those with better external financial access than their counterpart SMEs.

8.6.2 Elements for the Functioning of Subcontracting Linkages: Technical and Marketing Support

Next, *Technical and Marketing Support*, the first factor explaining nearly 40 percent of the total variance, was selected as a primary benefit and used as a dependent variable for univariate analysis of variance (ANOVA) and *t*-tests to examine the effects of several elements on the gains from subcontracting linkages. The last two columns of Table 8.11 probe the impact of the same independent variables on the functioning of only *Technical and Marketing Support* through subcontracting relationships, using ANOVA and *t*-tests. The results indicate that differences in benefit levels of *Technical and Marketing Support* were statistically significant at the 1 to 5 percent levels between groups in most of the explanatory variables.

On the whole, these results suggest that SMEs managed by non-*pribumi* entrepreneurs, those in the automobile and motorcycle subsectors, those whose owners and/or skilled workers have a higher level of education, and those with strong trust in parent firms obtained more benefits from subcontracting linkages in terms of improvements in technological and marketing capabilities, compared with their counterpart SMEs. Besides, *Technical and Marketing Support* under subcontracting linkages have been more useful to SMEs that hire more employees, those whose owners have working experiences in similar fields, those with longer-period business ties with parent firms, and those located in urban areas than their counterpart groups.

As already indicated in Table 8.9, the extent of benefits from technical support and provision of large/stable orders was closely related to firm-specific categories of ethnic affiliation, subsector and size. The owner of press parts supplier firm (*Firm S46*) with only eight employees has been energetic in acquiring dies-making and related technologies from a large foreign-affiliated shock absorber manufacturer (*Firm A17*), by taking advantage of his technological knowledge based on university education and previous working experience in metalworking.[17] The procurement division of a foreign-affiliated automobile assembler firm (*Firm A01*) appreciated the high technological capabilities of *Firm S06*. This SME, which has employed many skilled workers with a relatively high educational level, is able to absorb production technologies transferred from the automobile manufacturer without difficulties.

Subcontracting cooperation has provided *Firm S85*, a bicycle parts supplier firm, with fruitful outcomes from technical linkages, due to its trust in and respect for the principal firm, in addition to the owner's eagerness to learn technologies. *Firm S69* in Surabaya is a contrasting example. The owner of this agricultural machinery parts supplier firm worked for the current principal firm (*Firm A10*) for a long time up to 1989. He was one of the best skilled workers there. He, therefore, believes that he still has superior knowledge of technologies, compared to *Firm A10*. Because of this, he does not seek to learn technologies from *Firm A10* and, as a result, has not effectively utilised technological linkages through subcontracting ties, even though *Firm S69* has faced problems in product quality and production technology fields. It is likely that this supplier firm will not develop further without technological support from external sources.

Firm S12, which was founded in 1977 as a leaf spring supplier firm, acknowledged that it had taken a long time to establish vertical inter-firm relationships in which its parent firms provided invaluable technologies through technical support. Some sample SMEs in Sukabumi, a rural area in West Java, claimed that technical

[17] There are, of course, different cases. For instance, the owner of *Firm S85* is a non-technical high school graduate. However, he has been very enthusiastic about learning stamping technologies from the parent firm (*Firm A12*) and succeeded in the production of export-quality parts for bicycles. *Firm A12* raised the strong eagerness of the owner of *Firm S85* to master skills and technologies as the main reason for its continuous provision of technical support to the press parts supplier firm.

support has not been offered by urban-based assembler firms, because of their four-hour distance by car from Jakarta.

Finally, this study employs a multiple discriminant analysis to confirm whether the above elements really have effects on the extent of benefits from *Technical and Marketing Support* through subcontracting relations with large-scale parent firms.[18] For the discriminant analysis, the sample SMEs are divided into two groups according to whether their factor scores of *Technical and Marketing Support* are above or below the sample mean of zero. SMEs in the former group are categorised as "larger benefit earners" from *Technical and Marketing Support* through subcontracting linkages and those in the latter group as "smaller benefit earners."

Table 8.12 provides the results of the discriminant analysis. It shows that the elements of firm size, ethnic affiliation, subsector, educational levels of owners and workers, prior job experiences of owners, and trust in parent firms were significantly related to the better utilisation of subcontracting cooperation.[19] These findings are similar to those of the ANOVA and *t*-tests observed above. Our discriminant model as a whole was significant, as measured by particularly the χ^2 statistic. Overall, the discriminant function was able to correctly classify 84 percent of the sample SMEs into larger and smaller benefit earner groups.

[18] Using discriminant analysis, Siddharthan (1998) analysed the differential behaviour of the Japanese-affiliated enterprises in comparison with non-Japanese multinational and unaffiliated Indian counterparts in the Indian automobile subsector. Zhao and Co (1997) employed factor analysis and discriminant analysis to identify successful factors that contributed to adoption and implementation of advanced manufacturing technology in Singapore.

[19] As variables for educational levels of owners and skilled workers, the following 5-level classification, instead of 2-level classification of 0 (= lower educational level) and 1 (= higher educational level) in the previous parts, is used here: 1 = primary school or less, 2 = junior high school, 3 = senior high school, 4 = polytechnic (D3) level, and 5 = university.

Table 8.12 Discriminant Analysis: Effects of Elements on Technical and Marketing Support through Subcontracting Transactions with Parent Firms

Elements	*Wilks' Lambda*	F-values[1)]	*Correlations*[2)]	*Overall Discriminant Function*
1. *Size*	0.90	7.52 **	0.42	
2. *Ethnicity*	0.88	9.51 **	0.47	
3. *Subsector*	0.95	3.79 *	-0.30	
4. *Education (owners)*	0.95	3.90 *	0.30	
5. *Education (workers)*	0.91	6.82 **	0.40	
6. *Experience (owners)*	0.89	8.92 **	0.46	
7. *Business Continuity*	0.97	2.11	0.22	
8. *Trust*	0.83	15.00 **	0.59	
9. *Financial Access*	0.99	0.83	0.14	
10. *Location*	0.97	2.31	0.23	
Eigen Value				0.60
Canonical Correlation				0.61
Wilks' Lambda				0.62
χ^2 1)				31.17 **
Percent of grouped cases correctly classified (%)				83.6
Number of Sample Firms = 73				

Notes: 1) ** = significant at the 1 % level, * = significant at the 5 % level.
2) Pooled within-groups correlations between discriminating variables and standardised canonical discriminant function.

Source: Based on author's interview and questionnaire survey during 1999-2000.

These results suggest that high trust of SMEs in large parent firms has played a crucial role in effectively utilising technical and marketing linkages under subcontracting ties. This supports Berry's (1997: 20) statement that the functioning of subcontracting linkages depends largely on mutual trust and respect. Also, owners' working experiences in similar subsectors, educational levels of owners and skilled workers are essential to the effective use of technical and market ties through subcontracting networks. SMEs with experienced owners and higher-level human resources of owners and/or employees are better able to interact with large-scale parent firms in technical and marketing cooperation. These findings confirm suggestions in the literature that human capabilities of SMEs play important roles in the better utilisation of subcontracting linkages (Baranson 1967: 68-9; Berry 1997: 10).

Firm-specific variables (firm size, ethnicity and subsector) are also significant elements in determining the degree of benefit from technical and marketing assistance extended by large assembler firms. The value of technological and marketing linkages with principal firms is higher for larger SMEs, those owned by non-*pribumi* entrepreneurs and those in the automotive and motorcycle subsectors than their counterparts. These results of the discriminant analysis are consistent with the findings of previous studies (Berry 1997: 10; Lall 1980: 222; Odaka 1983: 354-5).

8.7 Subcontracting Mechanisms in Indonesia: Evidence from SMEs

Chapter 6 demonstrated that subcontracting linkages, among several other channels, have functioned as one of the most important support mechanisms of technology acquisition and marketing for SMEs in Indonesia. Chapter 7 suggested that subcontracting transactions with large-scale parent firms improve the productivity in these SMEs. The current chapter looked inside the "black box" of subcontracting linkages conducive to SME development. Explanations of subcontracting mechanisms are presented here as answers to each of the five research questions raised in the introduction to this chapter.

(1) Motivations for subcontracting transactions with parent firms

Large/stable orders and technical support have been the most important reasons why SMEs began subcontracting transactions with large-scale parent firms. Lower transaction costs and specialisation were also found to be important motivations. Managerial assistance through inter-firm relations was of modest importance. Compared with such reasons as *Technical and Marketing Support* and *Specialisation and Lower Transaction Costs*, *Financial Support* including provision of input materials was a relatively weak motivation for building subcontracting ties. However, *Financial Support* depends very much on firm categories. Smaller SMEs, those owned by *pribumi* entrepreneurs and those in the agricultural machinery and bicycle subsectors expected such financial assistance and material provision more strongly than their counterparts.

(2) Intermediary channels for the initiation of subcontracting relationships with parent firms

SMEs relied largely on inter-personal relationships such as family, relatives or friends to establish their initial contacts with their main customers and start subcontracting transactions. Peer firms in similar business lines also acted as intermediary agents. Several SMEs successfully engaged in subcontracting business because their owners previously worked for their current principal firms. These findings are consistent with the observation in Pakistan that more than half of the sample SMEs in the agricultural machinery industry established subcontracting linkages with parent firms through personal contacts (Nabi 1985: 12-3).

Other external channels were not generally used by firms in our case study. One-third of our sample firms approached main parent firms without prior direct or indirect relationships, but many of them were not smaller and *pribumi* SMEs, but rather larger and non-*pribumi* SMEs.

(3) Types of subcontracting linkages with parent firms

Provision of large/stable orders was the most popular type of subcontracting linkage with large-scale parent firms. Technical support including QC, production technology, and technical specifications was widespread among subcontracting SMEs. However, larger SMEs, non-*pribumi* owners and firms producing automotive and motorcycle parts are likely to establish these technical linkages with LEs more than their counterpart SMEs.

Similar to other studies (Hill 1985: 252-3; Thee 1985: 229), this study found that QC support and the provision of technical specifications, which were described as "low technical linkages" by Lall (1980: 217), were the most popular types of technical assistance obtained from large parent firms. "Medium and high technical linkages" by Lall's classification (1980: 217-8), such as support for production technologies and joint product development, were observed in our sample firms, particularly in larger SMEs, those managed by non-*pribumi* and those in the automobile and motorcycle subsectors. The extent of technological linkages observed in our survey appears greater than suggested by other studies.[20]

[20] Hill (1985) and Thee (1985) did not generally find "medium and high technical linkages" in respectively their Philippine and Indonesian case studies, in the early 1980s. Without further analysis, it seems likely that the differences between their findings and ours may be attributed to 1) the progress of industrialisation in Indonesia in the last 20 years and 2) differences in firm size and subsectors on which the studies are based.

Compared with technological and marketing ties, financial linkages were generally not as important to SMEs. Even though the setting of better payment conditions and provision of input materials and tools were found in 25 to 40 percent of the sample firms, provision of credit and financial guarantees, and support for the establishment of new firms were rarely observed. Vertical inter-firm linkages provided SMEs in our case study to some extent with working capital, but not investment capital. Our survey confirms the findings of Nabi (1985: 18-22) that roughly half of his sample SMEs relied on parent firms in financing working capital, whereas only five percent used them as a source of fixed investment capital.

(4) Costs of and benefits from subcontracting transactions with parent firms

This study revealed three major cost factors: 1) *QCD* (Quality, Cost and Delivery); 2) *Difficult Market Conditions*; and 3) *High Capital Requirement*. The four QCD burdens were high quality, high production technology, low-level prices and strict delivery timing, which are the same as those indicated by Berry (1997: 20-1) and the Japanese Small and Medium Enterprise Agency (1998: 98). Our survey identified market-related problems, particularly limited size of demand, tough competition in markets and finding parent firms at the initial stage as cost factors. Expensive raw materials/intermediate inputs and large production capacity, which required SMEs to have sufficient financial strength, were also regarded as impediments to conducting subcontracting business.

SMEs in our survey obtained large benefits from market provision and technical assistance through vertical inter-firm relations, which underlines findings by Watanabe (1971: 65). This can also be inferred from the number of respondents that have utilised technical and marketing linkages. Support for managerial technologies was modestly useful. The extent of the gains from such *Technical and Marketing Support* varied according to firm categories of size, ethnic affiliation or subsector. Larger SMEs, those run by non-*pribumi* and those operating in the automobile and motorcycle subsectors tend to utilise this technological and marketing assistance more effectively than their counterparts.

The sample SMEs found that the extent of benefits from specialisation and the reduction in transaction costs generated by subcontracting ties was moderate.[21] According to our cost analysis, SMEs have not been required to internalise R&D activities under subcontracting relations. Although this requirement was different according to groups in firm categories, de-internalisation of R&D can be considered as a part of benefits from subcontracting transactions. Without noting differences between groups in firm categories, subcontracting has not functioned well as a support mechanism for financing and the procurement of raw materials.

The actual gains from subcontracting relationships were lower than motivations for subcontracting transactions. Subcontracting cooperation with large-scale parent firms has not necessarily generated the expected degree of benefits, which should be reduced by costs associated with initiating and maintaining vertical inter-firm linkages in Indonesia. Yet our survey revealed that SMEs still obtained substantial benefits from subcontracting relationships with large-scale principal firms.

(5) Elements for the better functioning of subcontracting ties with parent firms

The essence of this question is how SMEs obtained larger benefits from subcontracting transactions. Subcontracting linkages tend to be more beneficial to SMEs with more

[21] Relatively small market and some other costs associated with subcontracting business in Indonesia mentioned above would reduce the degree of benefits from division of labour and lower transaction costs which Hondai (1992: 176-8) and Watanabe (1971: 71-2) stressed in their studies of Japan's experience.

employees, those run by non-*pribumi* owners, those in the automobile and motorcycle subsectors, those managed by entrepreneurs with higher-level education and working experiences in similar subsectors, those with a higher level of education of skilled workers, those with longer relationships with parent firms, those with stronger trust in principal firms, those with better external financial access and those located in urban areas than those counterpart SMEs. Although the explanatory power of each of these conditions was different, all of the elements had positive effects on the better use of subcontracting system as an effective support mechanism for SMEs. These results support previous studies such as Lall (1980: 222), Nabi (1985: 17-8) and Odaka (1983: 354-5).

Our analysis indicated that *Technical and Marketing Support* was related to almost the same elements as those mentioned above. Our discriminant analysis found that stronger trust of small-medium supplier firms in large parent firms, owners' job experiences in similar fields, higher educational levels of skilled workers and higher educational levels of SME owners, in addition to firm-specific elements of size (larger SMEs), ethnicity (non-*pribumi* SMEs), and subsector (SMEs in the automobile and motorcycle subsector), were crucial elements for the higher benefits from technological and marketing linkages through vertical inter-firm relations. These findings are consistent with arguments of Baranson (1967: 68-9) and Berry (1997: 10, 20).

Chapter 9

Subcontracting Transactions and SME Development in Indonesia: Qualitative Evidence from Parent Firms

9.1 Introduction

Chapter 6 found that inter-firm linkages, particularly subcontracting linkages, were essential support mechanisms for SME development in the Indonesian metalworking and machinery industry. Chapter 7, based on the estimates of the production functions and TFP indices, indicated that the degree of subcontracting transactions was positively related to the level of productivity of the sample metalworking and machinery SMEs in Indonesia. Chapter 8 gave a comprehensive picture of subcontracting mechanisms in Indonesia, using qualitative data from SMEs in the Indonesian metalworking and machinery industry. These chapters analysed subcontracting linkages and SME development in Indonesia from the perspective of SMEs.

This chapter changes the standpoint and gives an insight into subcontracting relations and SME development from the point of view of large-scale principal firms. Chapter 2 theoretically explained why large parent firms seek to conduct subcontracting transactions with small and medium supplier firms. This chapter investigates the detailed characteristics and functions of subcontracting ties with SMEs, in particular local SMEs, using qualitative data from large-scale assembler firms.[1] It examines how large-scale assembler firms perceive subcontracting transactions with SMEs, whether they intend to involve the SME sector in subcontracting linkages, and whether the subcontracting system has built-in support mechanisms for SME development.

More specifically, this chapter raises the following questions to confirm whether subcontracting linkages can function as support mechanisms for SME development.

(1) Why did large-scale assembler firms in Indonesia initiate subcontracting transactions with SMEs?
(2) What type of linkages have LEs established with SMEs through subcontracting?
(3) What kind of costs and benefits have LEs borne that are associated with and obtained from subcontracting transactions with SMEs? How significant are they?
(4) To what extent do large-scale parent firms support their small-medium supplier firms?

These four questions will be answered on the basis of a survey among assembler firms in the Indonesian automobile, motorcycle, agricultural machinery and bicycle subsectors. Table 9.1 lists several items as possible answers to each of the first three questions above, based on our discussion in Chapter 2, particularly Sections 2.2 and 2.3. Similar to Table 8.1, Table 9.1 includes several contradictory items, as some examples are indicated in the note. However, this is because Table 9.1 is designed to show the degree to which each item is regarded as relevant or not.

[1] Local SMEs (or LEs) in this study mean non-affiliated domestic SMEs (or LEs), as already explained in Chapter 5.

Table 9.1 Description of Items Listed in Motivations, Benefits, Costs and Linkage Types: Subcontracting Transactions with SMEs

Items	*Description*
Motivations for and Benefits to Parent Firms	
1. Specialisation	the concentration on assembling and other advantageous operations and the enjoyment of economies of scale, by contracting out disadvantageous processes to SMEs. (*I*)
2. Shock Absorber	the prevention of underutilisation or short capacity of internal resources in an economic fluctuation period, by adjusting order volume contracted out to SMEs. (*I*)
3. Lower Wages	the reduction of production costs of parts and components, by contracting out to SMEs with cheaper labour costs. (*I*)
4. Special Skills	the utilisation of skills unfamiliar to parent firms, by contracting out to SMEs with special technologies. (*I*)
5. Better Products	purchasing of parts and components satisfying requirements, by providing SMEs with stable business environment in a long and continuous contract period. (*S*)
6. Lower Costs for Monitoring Workers	the reduction of costs for monitoring workers, by limiting the number of own employees through contracting out to SMEs. (*I*)
7. Lower Costs associated with Contracting	the reduction of costs such as the collection of information on potential SMEs, preparation for contracts, enforcement of contracts, and following-up of contracts, by establishing close relations with SMEs. (*S*)
Costs for Parent Firms	
1. Initial Finding of SMEs	search for potential SMEs under the conditions of limited information. (*I*)
2. Slow Response	SMEs' slow response to instructions/claims. (*I*)
3. Low Quality	higher defect ratios of products supplied by SMEs due to insufficient QC knowledge, insufficient testing/inspection, etc. (*I*)
4. Low Technology	the difficulties in ensuring required products due to lower levels of production technologies and skills in the areas of process design, process technology, die/mold making, production line arrangements, etc. (*I*)
5. High Prices	higher prices of products because of inefficient production operations by SMEs. (*E*)
6. Unstable Delivery Timing	late or unstable delivery timing due to insufficient awareness, lack of production scheduling, etc. (*I*)
7. Monitoring SMEs	careful monitoring of SMEs to make them satisfy requirements in terms of quality, quantity, delivery time, etc. (*I*) (*S*)
8. Small Production Capacity	the difficulties in ensuring required quantity because of small production capacity of SMEs. (*I*)
9. Technical and Other Assistance	the provision of various support to SMEs that do not have sufficient technical and other related capabilities. (*I*) (*S*)

Table 9.1 Description of Items Listed in Motivations, Benefits, Costs and Linkage Types: Subcontracting Transactions with SMEs (continued)

Items	*Description*
Linkage Types established by Parent Firms	
1. Support of Establishment	direct assistance to potential entrepreneurs in establishing new supplier firms through the provision of credit, capital participation, guarantee of order, etc.
2. Stable Market	the provision of stable order in a long term, (with some exceptions during an economic fluctuation period).
3. Technical Specifications	the provision of detailed technical specifications (including detailed technical instruction and drawing).
4. Lending of Tools	the supply of tools such as dies, molds, etc.
5. Advice on Machinery	advice on the selection and layout of machinery and equipment.
6. Provision of Used Machinery	the provision of second-hand machinery and equipment at cheaper prices.
7. QC Support	transfer of QC technique (including testing/inspection methods and acquisition of industrial standards) through expert dispatch, training, etc.
8. Production Technology Support	transfer of production technologies and skills in the areas of process design, process technology, die/mold making, production line arrangements, etc. through expert dispatch, training, etc.
9. Joint Design	joint activities between parent firms and SMEs in the area of product design and development.
10. Managerial Support	transfer of managerial skills such as managerial planning, sales management, procurement management, human resource management, financial management, accounting, etc.
11. Provision of Inputs	the supply of input materials.
12. Financing Support (Provision of Credit/Guarantees)	the provision of credit and bank guarantees (including setting-up of reasonable payment conditions for SMEs).
13. Price Negotiations	setting-up of negotiation procedures to determine prices of products and services.
14. Market Information	the provision of information on new markets (products, clients, etc.).

Note: Several contradictory items are included in the table. For example, "Lower Wages" in motivations and benefits and "High Prices" in costs contradict each other. "Shock Absorber" in motivations and benefits and "Stable Market" in linkage types also contradict each other. In the former case, parts and components supplied by SMEs may be cheaper than those produced by parent firms. However, products supplied by foreign-affiliated SMEs will not have cost merits relative to those by local SMEs. Price levels of products supplied by SMEs are sometimes expensive relative to those expected by parent firms. In the latter case, parent firms possibly intend to provide SMEs with large/stable order during the period except for the outbreak of drastic economic changes, while, in sharp economic fluctuation periods like the recent economic crisis, they can use small-medium supplier firms as their shock absorber. In this way, the degree of merits and demerits of subcontracting with SMEs in the above list is not an absolute indication but a relative one. In Description above, (*I*), (*S*), and (*E*) indicate that subcontracting is more beneficial or costly than the vertical integration system, spot-base transactions, and expectation by parent firms, respectively.

Previous studies (e.g., Harianto 1996: 55-60; Mead 1984: 1103; Siddharthan 1998: 103-7) have shown that the characteristics of subcontracting linkages with supplier firms depend on sector and nationality of parent firms. This chapter therefore distinguishes between different groups of principal firms by subsector and origin of investment.

As noted in the preceding chapters, local SMEs have to rely on external sources through inter-firm linkages, because they have few other sources that can provide technical, marketing and other necessary support. On the other hand, foreign-affiliated SMEs can receive sufficient assistance from their foreign owner or partner companies. Thus, SMEs in the former group may wish more support from parent firms through subcontracting relationships than SMEs in the latter group. Taking account of these characteristics, this chapter investigates whether the behaviour of assembler firms is different towards local SMEs and foreign-affiliated SMEs.

The rest of this chapter is organised as follows. Section 9.2 describes the survey method together with the key characteristics of the sample parent firms. Section 9.3 presents the reasons why large assembler firms wish to maintain subcontracting transactions with small and medium supplier firms, and Section 9.4 explores linkage types that LEs have established with SMEs through subcontracting relations. In Section 9.5, costs associated with subcontracting arrangements and revealed benefits obtained from subcontracting linkages with SMEs are examined. Section 9.6 investigates the extent to which LEs are willing to assist SMEs and assesses how much effort they made or will make to improve capabilities of their small-medium supplier firms. The last section summarises the answers to the four research questions, which will confirm whether subcontracting linkages can support SME development.

9.2 Survey Method and Characteristics of the Sample Parent Firms

On the basis of our firm-level survey described in Chapter 5, this chapter analyses parent firms that engage in assembling operations in the automobile, motorcycle, agricultural machinery (including diesel engines for agricultural machinery) and bicycle (including tricycle) subsectors.

Based on several information sources explained in Chapter 5, 48 enterprises were identified as parent firms in the designated subsectors. Of the 48 manufacturers, 20 firms were nominated as those suitable for our survey and they were contacted by telephone. Among the 20 firms, five did not accept our visit because of unwillingness, bankruptcy or internal management problems. Subsequently, our intensive interview with presidents, vice presidents or at least relevant directors was carried out with 15 assembler firms (including one large-scale first-tier automotive component manufacturer) during 1999-2000.[2]

Table 9.2 demonstrates some of the basic characteristics of the sample parent firms in 1998. The automobile and motorcycle assembler firms accounted for almost half, and the agricultural machinery and bicycle manufacturers for the other half. Concerning investment nationality, one-third of the surveyed enterprises were unaffiliated Indonesian firms and the remaining were foreign affiliates. Nearly half of the firms had more than 1,000 workers. Roughly three-quarters of the surveyed manufacturers were located in Jakarta (and surrounding areas) and the rest were in Surabaya (including surrounding areas). Two-thirds of the sample assembler firms

[2] The performance of assembler firms was affected by the 1997-98 crisis. However, since this study was not designed to examine the impact of the economic crisis, it requested parent firms to consider the situation not only in the last 1-2 years but also in the last 5-10 years, when they responded to our interview questions on subcontracting issues. With regard to the impact of the crisis on manufacturing industry in Indonesia, see Thee (2000) and Chapters 4 and 5 of this study.

were established before 1979 and the remaining started operations in the 1980s and the 1990s.

Table 9.2 Profile of 15 Sample Assembler Firms in 1998

1. *Subsector*	
1) automobile/motorcycle[1)]	53%
2) agricultural machinery	20%
3) bicycle	27%
2. *Type of Investment (Investment Nationality)*	
1) domestic investment	33%
2) foreign investment	67%
3. *Size: Number of Workers*	
1) - 299	7%
2) 300 - 499	26%
3) 500 - 999	20%
4) 1,000 -	47%
4. *Location*	
1) Jakarta (surrounding areas)	73%
2) Surabaya (surrounding areas)	27%
5. *Year Established*	
1) - 1979	67%
2) 1980 - 1989	7%
3) 1990 -	26%
6. *Number of Subcontracting Supplier Firms*	
1) - 19	20%
2) 20 - 49	33%
3) 50 - 99	33%
4) 100 -	14%
7. *Market Share of Sample Firms (1999)*[2)]	
1) automobile	77%
2) motorcycle	40%

Notes: 1) This includes one large-scale automotive/motorcycle components producer.
2) The market share of the sample assembler firms in the agricultural machinery and bicycle subsectors is not available. For the former subsector, our sample includes the first and third largest assembler firms in Indonesia, and for the latter subsector encompasses the first and fourth largest bicycle manufacturers.

Sources: Based on author's interview survey during 1999-2000. The market share data for automobiles and for motorcycles are derived from GAIKINDO (Association of Indonesian Car Manufacturers) and PASMI (Association of Indonesian Motorcycle Assemblers and Manufacturers), respectively.

Nearly half of our sample parent firms had 50 or more supplier firms under subcontracting ties. The surveyed assembler firms in the automobile subsector occupied nearly 80 percent of the domestic market, whereas those in the motorcycle subsector accounted for 40 percent. For the agricultural machinery subsector, our sample includes the first and third largest assembler firms in Indonesia, and for the bicycle sector contains the first and fourth largest bicycle manufacturers.

9.3 Motivations for Subcontracting Transactions with SMEs

Table 9.3 explores the reasons for building subcontracting ties with small- and medium-scale supplier firms. It shows the degree of expectation parent firms had of subcontracting business with local and foreign SMEs. Explanation of each motivation is illustrated in Table 9.1.

What kind of motivations induced principal firms to establish subcontracting linkages with local SMEs? Lower wages were rated at the highest average score of 4.80 on a five-point Likert-type scale, where "5" represented the highest degree of expectation and "1" the lowest. The assembler firms perceived the lower level of wages as the most attractive feature that local subcontractors can provide. For example, a foreign-affiliated motorcycle assembler firm in Jakarta (*Firm A07*) with 73 supplier firms expected a reduction in production costs through subcontracting ties with lower-wage local SMEs in order to survive fierce domestic and international competition. There are no statistically significant differences between the automobile and motorcycle subsectors and the agricultural machinery and bicycle subsectors, or between domestic investment and foreign investment. Hence, most of the sample LEs expected that local SMEs would pass on cost advantages based on lower wages.

Table 9.3 Motivations for Subcontracting Transactions with SMEs

Motivations	Subcontracting with: Local SMEs — Mean Scores and Rank: (I)[1] (s.d.)	Rank	Local SMEs — Differences between Groups in Firm Categories: Subsector[2] *t*-values	Investment[3] *t*-values	Foreign SMEs — Mean Scores and Rank: (II)[1] (s.d.)	Rank	Comparison — Differences between (I) and (II)[4] *t*-values
1. *Specialisation*	4.60	2	0.20	0.00	4.53	3	1.00
	(0.51)				(0.52)		
2. *Shock Absorber*	3.47	5	1.23	0.24	2.93	7	4.00 **
	(0.74)				(0.70)		
3. *Lower Wages*	4.80	1	1.44	1.50	3.00	6	10.31 **
	(0.56)				(0.65)		
4. *Special Skills*	3.33	7	1.64	0.81	4.93	1	5.87 **
	(1.11)				(0.26)		
5. *Better Products*	4.20	3	1.71	0.69	4.80	2	3.67 **
	(0.77)				(0.41)		
6. *Lower Costs for*	3.87	4	2.33 *	1.47	4.07	4	1.87
Monitoring Workers	(0.52)		(-)		(0.59)		
7. *Lower Costs associated*	3.47	5	1.03	2.28 *	3.67	5	1.15
with Contracting	(0.64)			(-)	(0.49)		
Number of Sample Firms	15				15		

Notes: 1) Figures in the upper row are the average of scores indicated by assembler firms' rating from 1 (the lowest score as not at all important) to 5 (the highest score as very important). Figures in parentheses are standard deviation. (I) and (II) represent evaluation on local SMEs and on foreign-affiliated SMEs, respectively.

2) Difference in mean scores given by assembler firms in the automobile and motorcycle subsectors (AM) and by those in the agricultural machinery and bicycle subsectors (AB), which is indicated by *t*-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB firms > AM firms, (-) = AB firms < AM firms.

3) Difference in mean scores given by assembler firms of domestic investment (D) and by those of foreign investment (F), which is indicated by *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = D firms > F firms, (-) = D firms < F firms.

4) Difference in mean scores between evaluation on (I) local SMEs and on (II) foreign SMEs, which is indicated by *t*-values of paired *t*-test. ** = significant at the 1 level, * = significant at the 5 % level.

Source: Based on author's interview survey during 1999-2000.

Specialisation was the second most important motivation for subcontracting transactions, with an average rating of 4.60. Assembler firms expected vertical inter-firm linkages to promote a division of labour. For instance, *Firm A08*, a foreign-affiliated motorcycle producer in Jakarta with 99 vendor firms, intends to concentrate on assembling activities by contracting out other production processes to supplier firms. The parent firms in our sample expect that subcontracting allows them to allocate their capital and labour to the main business activities such as assembling and marketing, in order to optimise the use of resources.

Ensuring better products was also rated high as a reason for subcontracting, with an average score of 4.20. This indicates that, by establishing close subcontracting relationships with local SMEs, parent firms want to ensure that supplied products meet their technical, quality and delivery requirements. Through subcontracting linkages, assembler firms have given local SMEs clear and detailed information on how to produce parts and components. Because local SMEs do not usually have sufficient technical and other necessary knowledge, it seems difficult to procure satisfying products and services from them in spot-base transactions or without any technical guidance through close relationships. The expectations are not significantly different according to groups in firm categories of subsector and nationality of investment.

Reduction in costs for monitoring labour was also rated high, with a mean score of 3.87. If assembler firms adopt an in-house production system, they need to hire a larger number of workers, which may result in an increase in the cost of monitoring the work effort of employees. Subcontracting arrangements enable principal firms to save on such costs. The sample assembler firms in the automobile and motorcycle subsectors expected that such costs would be significantly lower than firms in the agricultural machinery and bicycle subsectors. Producers in the former subsector have usually much longer and more complicated production processes, and as a consequence, they need to hire relatively more employees. From that perspective, their expectations of reducing the cost of monitoring through subcontracting are higher.

Firms also expected subcontracting to lead to lower costs associated with contracting, with an average score of 3.47. The *t*-tests suggest that foreign-affiliated manufacturers had greater expectations of the opportunity to reduce transaction costs of collecting information, coping with uncertainties and risks, and preparing and enforcing contracts than unaffiliated Indonesian assembler firms.

Similar to business costs, the expected role of subcontracting as shock absorber was rated at an average score of 3.47. The differences between groups of firm categories by subsector and investment nationality are small. Therefore, all parent firms expected local subcontractors to enable them to cushion economic fluctuations.

The special skills that local metalworking and machinery firms may offer assembler firms were ranked the lowest, with an average score of 3.33. This outcome was roughly the same according to subsector and investment categories. For example, *Firm A08*, which is a motorcycle assembler firm, regarded local SMEs as producers of simple parts, but saw foreign-affiliated counterparts as producers of complicated components. The low ranking may reflect the fact or perception that the local SME sector has insufficient technical capabilities.

The expectations parent firms had of foreign-affiliated SMEs are different from those of local SMEs, as Table 9.3 shows. Special skills were mentioned as the most important inducement to establish inter-firm linkages with foreign-affiliated SMEs. An average score of 4.93 shows that parent firms strongly desire to utilise the special technical skills and know-how foreign-affiliated supplier firms can offer. The mean scores of expectations regarding technological expertise were statistically different at the 1 percent level between subcontracting transactions with local SMEs and with foreign-affiliated SMEs.

Better products were rated in second place with an average score of 4.80. Parent firms clearly expected subcontracting with foreign SMEs to yield better products and services. The mean scores of expectations of local SMEs and foreign-affiliated SMEs were significantly different. *Firm S63*, a Japanese-affiliated SME in Jakarta engaged in press stamping for the automotive, motorcycle and electrical parts, mentioned that the majority of its resources have been allocated to produce products of long-term contracts and that, as a consequence, it is not easy to produce output with high quality and sufficient quantity on time on the basis of spot-base orders. Foreign subcontractors often need these long-term work arrangements to guarantee quality, quantity and delivery timing of products. In this sense, the surveyed assembler firms expected foreign-affiliated SMEs through subcontracting to supply good products and services.

Specialisation, lower costs for monitoring workers and lower costs associated with contracting were rated highly, with average scores of 4.53, 4.07 and 3.67, respectively. These ratings and the ranking of subcontracting transactions with foreign-affiliated SMEs are not very different from those with local SMEs.

In contrast, lower wages and shock absorbers were rated not high, with average scores of 3.00 and 2.93, respectively. These expectations for foreign-affiliated SMEs are significantly lower than for local SMEs. This is because wage levels of foreign-affiliated SMEs are higher than their local counterparts.[3]

---

[3] According to BPS' unpublished data of *Large and Medium Manufacturing Statistics*, the average wage rate of SMEs with 20-299 workers classified as PMA (foreign-affiliated firms) was 2.9 times as high as that of SMEs classified as non-PMA (local firms) in 1996. This wage difference between local SMEs and foreign-affiliated SMEs is a consequence of some factors. One of the main reasons is the shortage of skilled workers compared with unskilled workers (Oshima 1987: 66). Local SMEs without sufficient financial resources generally cannot employ skilled workers, while foreign-affiliated SMEs can do this in a relative sense by paying higher wages. This dual labour market structure can be explained by an efficiency-wage theory of the labour market (Akerlof 1984: 79). Wages at market clearing are observed in the local SME sector and those in excess of market clearing are in the foreign-affiliated SME sector.

In general terms, the items listed in Table 9.3 are the most important motivations for contracting out part of the production processes to small-medium supplier firms. Local SMEs were expected to deliver lower wages but not to draw on special skills. On the other hand, foreign-affiliated SMEs were not primarily expected to provide lower wages and perform a shock absorber function but to deliver benefits associated with technological expertise and higher-quality products.

9.4 Types of Subcontracting Linkages with SMEs

As explained in Chapter 2, Lall's study (1980: 208-9, 213-22) presented ten types of inter-firm linkages between two truck assembler firms and their parts suppliers in India. By modifying Lall's classification, this chapter identified 14 categories of linkages provided by assembler firms to their supplier firms in Indonesia (see Table 9.1).

Table 9.4 shows the number of the sample parent firms which have extended each type of linkage to their local and foreign-affiliated supplier firms under subcontracting relationships. Technical specifications have been provided by all sample parent firms. More than 90 percent of principal firms provided SMEs with technical linkages through support in the areas of QC and production technology. Most of the respondents offered technological support to SMEs particularly in the introduction of new models and the emergence of technical problems. This corresponds with the results of Chapter 8, in which around 90 percent and 80 percent of the sample SMEs mentioned receiving QC guidance and production technology assistance, respectively, from their parent firms through subcontracting relationships.

As indicated in the efficiency-wage hypothesis, by paying higher wages or wages in excess of market clearing, foreign-affiliated SMEs can obtain benefits such as: 1) a larger opportunity to hire skilled workers; 2) the reduction of shirking by employees due to a higher cost of job loss; 3) lower turnover; and 4) improved morale (Yellen 1984: 200).

Table 9.4 Types of Subcontracting Linkages with Local and Foreign-affiliated SMEs

Linkage Types	No. of Firms and Rank		Differences between Groups in Firm Categories	
	No. of Firms [1] (%)	Rank	Subsector [2] p-values	Investment [3] p-values
1. *Support of Establishment*	5 (33.3)	12	0.28	0.60
2. *Stable Market*	12 (80.0)	4	0.08	0.02 * (-)
3. *Technical Specifications*	15 (100)	1	-	-
4. *Lending of Tools*	11 (73.3)	5	0.03 * (-)	0.08
5. *Advice on Machinery*	7 (46.7)	8	1.00	1.00
6. *Provision of Used Machinery*	6 (40.0)	10	0.61	0.58
7. *QC Support*	14 (93.3)	2	0.47	0.33
8. *Production Technology Support*	14 (93.3)	2	0.47	0.33
9. *Joint Design*	5 (33.3)	12	1.00	0.60
10. *Managerial Support*	7 (46.7)	8	1.00	1.00
11. *Provision of Inputs*	11 (73.3)	5	1.00	0.56
12. *Financing Support (Provision of Credit/Guarantee)*	5 (33.3)	12	0.28	0.60
13. *Price Negotiations*	9 (60.0)	7	0.00 ** (-)	0.00 ** (-)
14. *Market Information*	6 (40.0)	10	0.12	0.58
Number of Sample Firms	15			

Notes: 1) Figures in the upper row indicate the number of assembler firms which provide local and/or foreign-affiliated SMEs with each subcontracting linkage. Figures in parentheses are the share of firms with each linkage in the total sample firms.

2) Difference in frequency ratios between assembler firms in the automobile and motorcycle subsectors (AM) and the agricultural machinery and bicycle subsectors (AB), which is indicated by p-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = AB firms > AM firms, (-) = AB firms < AM firms.

3) Difference in frequency ratios between assembler firms of domestic investment (D) and foreign investment (F), which is indicated by p-values of Fisher's exact test. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = D firms > F firms, (-) = D firms < F firms.

Source: Based on author's interview survey during 1999-2000.

For example, *Firm A05*, a foreign-affiliated automobile assembler firm in Jakarta, has continuously assessed the performance of subcontractors on product quality and delivery timing. It organised monthly meetings with many of its 105 supplier firms and, based on evaluations from the preceding month, requested them to improve product quality and delivery problems where necessary. *Firm A05* sent QC staff members to supplier firms which consistently failed to overcome difficulties and gave them guidance in product quality, production technology and delivery timing. *Firm A03*, a large automobile manufacturer in Indonesia located in Jakarta, has been very interested in improving the technological capabilities of their parts and components supplier firms.[4] Before 1998, *Firm A03* had 15 quality improvement (*Kaizen*) staff members in its purchasing division, who were fully responsible for technical assistance to vendor firms.[5] It selected a manageable number of its supplier firms and supported these intensively for a certain period in enhancing quality management and production technology, by dispatching its *Kaizen* staff to the individual factory sites. The selected vendor firms were encouraged to upgrade their QC activities and were to participate in an annual QC competition organised by *Firm A03*.

Firm A11 with 42 parts and components supplier firms, a foreign affiliate producing diesel engines for agricultural machinery in Jakarta, also acknowledged the need for technical support, particularly in the QC area. It frequently sent employees of its purchasing division to local supplier firms. Since local vendor firms did not usually consult *Firm A11* about technical problems, it visited them regularly in order to familiarise itself with the structural problems of supplier firms and gave them QC and technical guidance to solve such issues. An Indonesian bicycle assembler in Surabaya

[4] For the effective transfer of technology to supplier firms, many of the automobile and motorcycle assembler firms, including *Firm A03*, have organised vendor firms in individual cooperation groups as institutional devices to provide them with technical support.
[5] In 1998, *Firm A03* had to suspend this support program due to the impact of the economic crisis.

(*Firm A12*) with around 30 supplier firms stressed the importance of "working together with vendor firms" (the firm's motto). It seeks to improve their product quality and delivery time by arranging a long-term stay of QC staff at workshops. Similarly, the largest bicycle manufacturer in Indonesia (*Firm A13*), which is a non-affiliated Indonesian entity located in Surabaya, has given vendor firms technical support through the dispatch of engineers. However, *Firm A13* pointed out that technical support to supplier firms would not necessarily generate a successful outcome. Its experience was that, after technical assistance, some of them did not improve performance, while others moved to different assembler firms and served them in an opportunistic way.

Advice on layout and selection of production machinery has been offered by seven of the sample manufacturers to subcontracting SMEs. Joint design and joint product development have not been so common. Only five firms have given SMEs opportunities for joint design and development under subcontracting ties. Generally, cooperation like joint design requires both assembler firms and supplier firms to have sufficient technological capabilities. Insufficient technological levels of LEs and/or SMEs are likely to lead to infrequent efforts at joint design and development activities.[6]

Nearly half of the large-scale assembler firms have transferred managerial technology to small-medium supplier firms. This percentage is close to the result of Chapter 8, where 55 percent of SMEs received management assistance from parent firms through subcontracting linkages. For example, *Firm A08*, a major foreign-affiliated motorcycle manufacturer, noticed that supplier firms, especially local SMEs, were not able to take full advantage of their production facilities and employees mainly because of insufficient management capabilities. For this reason, *Firm A08* started a

[6] Many of the foreign-affiliated assembler firms in our sample admitted that they are usually required to have permission from headquarters for new design or development of parts and components. In addition to insufficient technological capabilities of assembler firms and supplier firms, this organisational constraint is one of the reasons why joint design and development are infrequent.

plant-tour-type study program to let supplier firms exchange ideas on how to improve their management capabilities, as already described in Chapters 6 and 8. *Firm A03*, a large auto manufacturer in Indonesia, has a specific program for production management. It offered two types of seminars to improve managerial capabilities for production: one for the top management of vendor companies; and the other for managers responsible for production lines at factories.

According to Table 9.4, 80 percent of our sample parent firms have provided supplier firms with stable markets. For instance, *Firm A08*, a motorcycle assembler firm, has usually given supplier firms a one-year order forecast, which helps stabilise sales and assists firms in preparing long-term marketing strategies. The results of the Fisher's exact test in the last column indicate that foreign-affiliated assembler firms tend to offer subcontractors better marketing support than their domestic counterparts in terms of the provision of stable orders. The likely reason is that manufacturers in the former group generally have a larger market size and greater corporate strength than those in the latter group. Market information about new domestic and export markets has also been offered to small and medium supplier firms by 40 percent of parent firms.

More than 70 percent of the assembler firms have provided small-medium parts supplier firms with raw materials, intermediate goods and tools (e.g., dies and molds) through subcontracting arrangements. For example, *Firm A05*, a foreign affiliate in the automobile subsector, stated that small-medium supplier firms in this field have faced difficulties in procuring necessary input materials due to the weaknesses of Indonesia's heavy and chemical industries, which result partly in the underdevelopment of the metalworking and machinery SME sector. Recognising the difficult situation, *Firm A05* has provided raw materials to small and medium supplier firms. In the same way, *Firm A04*, which is a foreign-affiliated automobile assembler firm in Jakarta and has over a hundred vendor firms, explained that, since dies and molds are technologically weak in Indonesia, it has had to lend precision tools to vendor firms engaged in press stamping, die-casting, plastic injection and so on.

The share of the assembler firms that have supplied tools to SMEs in the total sample is statistically different between manufacturers in the automobile and motorcycle subsectors and those in the agricultural machinery and bicycle subsectors. The difference may reflect the characteristics of the subsectors. Compared with the agricultural machinery and bicycle subsectors, the automobile and motorcycle subsectors tend to require supplier firms to produce higher quality parts and components, which often need very precise and more expensive tools.

Under subcontracting ties, 33 percent and 40 percent of the sample assembler firms have furnished SMEs with support related to the establishment of firms and the provision of second-hand machinery and equipment, respectively. Similarly, only one-third of the principal firms have offered small-medium supplier firms support in the form of credit and financial guarantees. For instance, *Firm A01* is a foreign-affiliated automobile manufacturer in Jakarta, which was established in 1970 and owns more than 80 supplier firms. It is one of a few enterprises in our sample that has assisted in the establishment of new vendor firms by guaranteeing a certain amount of orders and lending the initial investment capital. It has provided supplier firms with credit and financial guarantees. *Firm A10*, a non-affiliated assembler firm in the agricultural subsector, facilitated the establishment of new SMEs by former employees by guaranteeing orders for a certain period.

Nine assembler firms gave small and medium supplier firms chances to negotiate the prices of products and processing services. The statistical tests indicate that the proportion of parent firms that opened price negotiations for SMEs was significantly different at the 1 percent level between groups by subsector and investment nationality. Large-scale assembler firms in the automobile and motorcycle subsectors and those with foreign investment tend to give small and medium supplier firms more opportunities to negotiate the prices of products, compared to their counterparts in the agricultural machinery and bicycle subsectors and those with domestic investment. The assembler firms in the former group have generally adopted the negotiated cost-plus fee method or similar schemes. Those in the latter group do not tend to open up the process of price setting to supplier firms. This tendency is consistent with the responses from SMEs in Chapter 8.

Among the financial linkages described above, price negotiations and provision of input materials and tools are popular forms of assistance by assembler firms for SMEs. In contrast, the provision of credit and guarantees, that of used machinery, and assistance in establishing enterprises are not often extended to small-medium supplier firms. This implies that subcontracting cooperation provides SMEs to some extent with working capital. Investment capital may also be made available, but not to a sufficient degree.

This section has shown that, among subcontracting linkages, technological and marketing relations are generally more popular than financial ones. These findings confirm those in Chapter 8.

9.5 Costs of and Benefits from Subcontracting Transactions with SMEs

The first part in this section investigates burdens on principal firms in conducting subcontracting business with small-medium metalworking and machinery firms. The second part explores several kinds of realised benefits to parent firms generated by subcontracting transactions with SMEs. After looking into costs and revealed benefits separately, the last section evaluates cost-benefit balance of subcontracting transactions with SMEs. Each of the cost and benefit items is explained in Table 9.1.

9.5.1 Costs of Subcontracting Transactions with SMEs

Table 9.5 lists the costs that principal firms associate with subcontracting with local SMEs, together with the differences of the burdens between groups by categories of parent firms.

Unstable delivery timing was rated at the highest average score of 4.87. Regardless of subsector and investment origin, the large-scale parent firms perceived unreliable delivery time of local SMEs as the heaviest burden in conducting subcontracting transactions. For instance, *Firm A05*, an auto manufacturer, has been aware of losses due to unstable delivery timing of local SMEs and has introduced a monthly evaluation of delivery time as well as product quality. Similarly, *Firm A03* in the automobile subsector considers imprecise delivery time and the resulting shortage or excessive stock of intermediate inputs as the main factor for high product costs. By introducing the well-known "just-in-time system," *Firm A03* has attempted to diffuse this technique to supplier firms, in particular local SMEs, and to improve their management system of delivery timing.

Table 9.5 Costs of Subcontracting Transactions with SMEs

Costs	*Subcontracting with*						*Comparison*
	Local SMEs				*Foreign SMEs*		
	Mean Scores and Rank		*Differences between Groups in Firm Categories*		*Mean Scores and Rank*		*Differences between (I) and (II)*[4]
	(I)[1] (s.d.)	*Rank*	*Subsector*[2] *t*-values	*Investment*[3] *t*-values	(II)[1] (s.d.)	*Rank*	*t*-values
1. *Initial Findings of SMEs*	4.07 (0.59)	5	0.45	0.60	2.53 (0.52)	6	7.99 **
2. *Slow Response*	3.33 (0.49)	7	1.51	2.08	2.27 (0.46)	7	5.17 **
3. *Low Quality*	4.20 (0.77)	2	1.71	4.16 ** (-)	3.27 (0.70)	3	6.09 **
4. *Low Technology*	4.00 (1.00)	6	1.64	3.87 ** (-)	3.13 (0.83)	4	3.67 **
5. *High Prices*	3.33 (0.90)	7	0.37	0.39	4.53 (0.52)	1	4.58 **
6. *Unstable Delivery Timing*	4.87 (0.35)	1	0.10	0.51	3.53 (0.92)	2	5.74 **
7. *Monitoring SMEs*	4.13 (1.13)	3	0.88	0.64	2.60 (0.83)	5	5.28 **
8. *Small Production Capacity*	2.73 (0.59)	9	3.85 ** (-)	3.15 ** (-)	1.87 (0.64)	9	9.54 **
9. *Technical and Other Assistance*	4.13 (1.06)	3	2.05	2.31	2.27 (0.70)	7	8.67 **
Number of Sample Firms	15				15		

Notes: 1) Figures in the upper row are the average of scores indicated by assembler firms' rating from 1 (the lowest score as very small) to 5 (the highest score as very large). Figures in parentheses are standard deviation. (I) and (II) represent evaluation on local SMEs and on foreign-affiliated SMEs, respectively.

2) Difference in mean scores given by assembler firms in the automobile and motorcycle subsectors (AM) and by those in the agricultural machinery and bicycle subsectors (AB), which is indicated by t-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB firms > AM firms, (-) = AB firms < AM firms.

3) Difference in mean scores given by assembler firms of domestic investment (D) and by those of foreign investment (F), which is indicated by t-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = D firms > F firms, (-) = D firms < F firms.

4) Difference in mean scores between evaluation on (I) local SMEs and on (II) foreign SMEs, which is indicated by t-values of paired t-test. ** = significant at the 1 level, * = significant at the 5 % level.

Source: Based on author's interview survey during 1999-2000.

Lower quality of products and processing services supplied by local metalworking and machinery SMEs was ranked the second highest, with an average score of 4.20. The assembler firms suffered from low quality of supplied parts and components. The firms also cited low production technology of local supplier firms as a substantial cost factor associated with inter-firm linkages, with a rating of 4.00 on average. The *t*-tests show that foreign-affiliated parent firms perceived low quality and insufficient technology as more serious problems than their domestic counterparts. Because of the higher quality of their final products and their experience outside Indonesia, foreign-affiliated manufacturers are more quality- and technology-conscious than their non-affiliated counterparts.

The cost of monitoring local supplier firms was significant, with a mean score of 4.13. Considering great concerns about unstable delivery timing, low quality and low technology, LEs in our sample have had to supervise their local supplier firms closely. For example, *Firm A08*, a motorcycle assembler firm, monitors and evaluates vendor firms regularly on quality control, production control, production engineering, management control, purchasing control, and labour control. In this way, *Firm A08* has to regularly allocate a considerable amount of money, time and human resources to monitoring in order to prevent costs caused by unreliable delivery time, unsatisfactory quality and insufficient technology.

The sample manufacturers assigned a high average score of 4.13 to technical and other related assistance to local supplier firms. If LEs wish to make vertical inter-firm relations workable, they are required to enable local SMEs to address problems associated with unstable delivery timing, low quality and low technology through technical assistance.

The cost of searching for and finding suitable local SMEs was rated an average score of 4.07. Even large-scale assembler firms do not usually have sufficient data and information on potential local supplier firms. For example, *Firm A08*, a foreign-affiliated motorcycle assembler firm, claimed that since there is limited information on competent local SMEs in Indonesia, the firm had to take substantial man-hours to seek them out. Even after finding potential local producers, *Firm A08* indicated that it still needs to carefully collect information that confirms product quality, production facilities and management capabilities.

High prices of products and services and slow response from local supplier firms were rated at modest average scores of 3.33. Local SMEs can offer LEs much lower prices of products and services than their foreign-affiliated counterparts. Assembler firms did not regard price levels as very serious obstacles to subcontracting business with local vendor firms.

Small production capacity was ranked the lowest, with a mean score of 2.73. Compared to other costs listed in Table 9.5, the low production capacity of local SMEs was regarded as less obstructive to the successful implementation of subcontracting transactions. This relatively low rating may have been affected by the sharp decrease in demand for products in the subsectors due to the recent economic crisis. If our field research had been carried out in the high economic growth period, the result is likely to have been different. Because of contracted demand during the crisis period, parent firms did not perceive low production capacity of SMEs as a serious problem. Differences in average scores of small capacity were statistically significant at the 1 percent level according to subsector and investment nationality. The assembler firms in the automobile and motorcycle subsectors and those with foreign investment have been more aware of difficulties due to the low capacity of local SMEs than their counterparts in the agricultural machinery and bicycle subsectors and those with domestic investment, reflecting differences in order volume between the two manufacturer groups. Since LEs in the former group generally place a larger order, they tend to regard the small capacity of SMEs as a more apparent problem than those in the latter group.

The ranking and degree of costs given by our sample parent firms were different between subcontracting transactions with local SMEs and with foreign-affiliated SMEs. Significantly different were the high prices of products and services. In contrast to local SMEs, the parts and components from foreign-affiliated supplier firms were deemed relatively expensive, with an average score of 4.53. The difference was statistically significant at the 1 percent level. Many of the assembler firms pointed out that quality, technology and delivery timing of foreign-affiliated supplier firms were acceptable, but that the prices of their products were high.

Unlike in the case of local SMEs, technical and other necessary assistance to foreign-affiliated SMEs was ranked the second lowest, with a mean score of 2.27. The difference was statistically significant at the 1 percent level. This seems reasonable, because better quality, technology and delivery timing of foreign-affiliated supplier firms do not require parent firms to allocate much time and costs to technical and other support.

The ranking of other listed variables for foreign-affiliated SMEs was not much different from that for local SMEs. However, the average scores of such variables for the latter group were significantly higher than for the former group. This indicates that, if large-scale principal firms wish to exploit lower price levels of parts and components offered by local SMEs, they have to bear higher levels of other costs, compared to foreign-affiliated SMEs.

9.5.2 Benefits from Subcontracting Transactions with SMEs

The reasons why parent firms wished to exploit subcontracting business with SMEs were investigated in Section 3. This section analyses realised benefits that parent firms have gained from subcontracting arrangements with SMEs. Table 9.6 indicates the degree of benefits that the surveyed assembler firms obtained from vertical inter-firm relations with local SMEs and foreign-affiliated SMEs. It also presents differences in the mean scores between groups in the categories of parent firms and between local SMEs and foreign-affiliated SMEs.

The most valuable benefit from subcontracting ties with local metalworking and machinery SMEs was lower wages, which were rated at a mean score of 4.53. The average score and the ranking are similar to those of the motivations in Table 9.3. It is also consistent with the observation in Table 9.5, where price levels of parts and components were not a serious problem in conducting subcontracting transactions with local SMEs. LEs obtained significant benefits of lower wages provided by local supplier firms. For example, *Firm A07* explained that cost advantages resulting from lower wage rates based on economies of small-scale production was one of the most important reasons for price competition in the domestic and international motorcycle market.

Table 9.6 Revealed Benefits from Subcontracting Transactions with SMEs

Revealed Benefits	Subcontracting with Local SMEs: Mean Scores and Rank (I)[1) (s.d.)	Rank	Local SMEs: Differences between Groups in Firm Categories: Subsector[2)] t-values	Investment[3)] t-values	Foreign SMEs: Mean Scores and Rank (II)[1)] (s.d.)	Rank	Comparison: Differences between (I) and (II)[4)] t-values
1. *Specialisation*	4.13 (0.92)	2	1.07	0.19	4.33 (0.72)	3	1.38
2. *Shock Absorber*	3.87 (0.64)	4	0.74	1.49	3.67 (0.62)	5	0.76
3. *Lower Wages*	4.53 (0.64)	1	1.46	0.56	3.47 (0.74)	7	5.17 **
4. *Special Skills*	2.53 (0.74)	7	1.23	0.48	4.40 (0.51)	2	8.67 **
5. *Better Products*	4.00 (0.93)	3	1.72	0.95	4.60 (0.51)	1	2.81 **
6. *Lower Costs for Monitoring Workers*	3.67 (0.49)	5	1.88	0.36	3.93 (0.70)	4	1.74
7. *Lower Costs associated with Contracting*	3.00 (0.53)	6	2.18 * (-)	1.03	3.53 (0.52)	6	2.78 *
Number of Sample Firms	15				15		

Notes: 1) Figures in the upper row are the average of scores indicated by assembler firms' rating from 1 (the lowest score as not at all beneficial) to 5 (the highest score as very beneficial). Figures in parentheses are standard deviation. (I) and (II) represent evaluation on local SMEs and on foreign-affiliated SMEs, respectively.

2) Difference in mean scores given by assembler firms in the automobile and motorcycle subsectors (AM) and by those in the agricultural machinery and bicycle subsectors (AB), which is indicated by *t*-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB firms > AM firms, (-) = AB firms < AM firms.

3) Difference in mean scores given by assembler firms of domestic investment (D) and by those of foreign investment (F), which is indicated by *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = D firms > F firms, (-) = D firms < F firms.

4) Difference in mean scores between evaluation on (I) local SMEs and on (II) foreign SMEs, which is indicated by *t*-values of paired *t*-test. ** = significant at the 1 level, * = significant at the 5 % level.

Source: Based on author's interview survey during 1999-2000.

Specialisation achieved an average rating of 4.13. Subcontracting business with local SMEs allowed principal firms to specialise in the assembling process and improve production efficiency. For instance, *Firm A06*, a foreign-affiliated manufacturer producing automotive components such as air-conditioners, radiators, alternators and starters, pointed out that the production processes of local SMEs were generally in the areas of simple and labour-intensive technologies, where large-scale parent firms would not have significant advantages. Thus, *Firm A06* has sought to concentrate on specialised processes through the contracting out of processes with little advantages to local vendor firms. It achieved a more efficient utilisation of its production factors.

Ensuring better products was given an average score of 4.00. Subcontracting linkages made it possible for manufacturers to purchase better parts and components from local supplier firms. For instance, *Firm A04* stated that automobile manufacturers could not easily procure good products and services in Indonesia without close relationships and mutual understanding between buyers and local sellers. It maintained that, after the establishment of subcontracting linkages, it was able to purchase reliable parts and components from local vendor firms. In addition, *Firm A12* reported that even a bicycle assembler firm had to establish close subcontracting linkages if it intended to buy products and services with a certain minimum quality from local SMEs.

The role of shock absorber was given a mean score of 3.87. Sample parent firms regarded local supplier firms as shock absorbers, which allowed them to avoid short or idle capacity of workers and production facilities during periods of economic upturn, respectively downturn. All of the surveyed assembler firms admitted that they were able to respond flexibly to the downturn in demand during the 1997-98 economic crisis period by reducing orders to their local supplier firms.

In line with expectations in Table 9.3, subcontracting linkages enabled sample LEs to reduce the cost of supervising hired employees. A mean score of 3.67 indicates gains of lower costs for monitoring own workers. Consistent with our theoretical framework in Chapter 2, all of the sample manufacturers have struggled to improve work morale and discipline, for instance, by providing incentives including promotions and bonuses. Subcontracting arrangements allow them to reduce the number of their own workers. They are an effective way to save costs for supervising directly hired employees.

The parent firms assigned a moderate average score of 3.00 to lower costs associated with contracting. For example, *Firm A08*, a foreign-affiliated motorcycle manufacturer, indicated that, compared to spot-based transactions, subcontracting could reduce the costs of collecting information on potential supplier firms, coping with uncertainties and risks, preparing contracts, enforcing contracts and following up contracts. Statistical tests show that assembler firms in the automobile and motorcycle subsectors drew more benefit from the reduction of transaction costs than those in the agricultural machinery and bicycle subsectors. The explanation is that the former group generally has a much greater number of supplier firms involved, handles more parts and components under more complicated contracts, and is more engaged in strict enforcement of contracts than the latter group.

The benefits of special skills that local vendor firms offered were ranked the lowest, with an average score of 2.53. Local SMEs do not usually have advanced skills to provide large-scale principal firms with technical expertise through subcontracting. For instance, *Firm A08* maintained that simple parts and easy processes would often be contracted out to local SMEs, but complicated components and difficult processing to foreign-affiliated SMEs.

The most remarkable benefit from subcontracting linkages with foreign-affiliated SMEs was to ensure better products. With a rate of 4.60, this was ranked the highest. This outcome is statistically different from local SMEs. As explained in the previous section, foreign-affiliated SMEs are generally willing to make a longer-term allocation of their resources in order to supply reliable parts and components.

With an average score of 4.40, special skills were ranked the second highest. This is in contrast to the lowest ranking in the case of local SMEs. The difference was statistically significant, which implies that both categories of SMEs have different levels of technological capabilities.

Lower wages were rated the lowest, with a mean score of 3.47, lower than for local SMEs. The difference between both categories of SMEs was statistically significant at the 1 percent level. This is consistent with the observation in the previous subsection that the parts and components from foreign-affiliated supplier firms are regarded as relatively expensive.

The ranking of other variables was not so different between foreign-affiliated SMEs and local SMEs. Average scores of benefits were not statistically different, except for lower costs associated with contracting.

Table 9.6 indicates that subcontracting business with local SMEs provides large-scale parent firms with benefits of lower wages and shock absorption. Subcontracting relationships with foreign-affiliated SMEs offer LEs benefits of special skills and better products.

In Table 9.7, factor analysis is used to group the above benefits from subcontracting transactions with local SMEs into three major factors. The three extracted factors explain 80 percent of the total variance. The first factor, *Specialisation and Lower Transaction Costs*, accounts for 43 percent of the variance and consists of the first three variables in the table: specialisation (with a factor loading of 0.86), lower costs for monitoring workers (0.82), and lower costs associated with contracting (0.75). The second factor, *Economies of Small-scale Production*, explains 21 percent of the variance and is made up of two variables: shock absorber (0.93); and lower wages (0.78), which are the main revealed benefits specific to local supplier firms. The third factor, *Quality and Skills*, accounts for 16 percent of the variance and comprises two variables of special skills (0.93) and better products (0.70).

Table 9.7 Matrix of Factor Loadings: Revealed Benefits from Subcontracting Transactions with Local SMEs

Revealed Benefit Variables	*Factor 1* *Specialisation and Lower Transaction Costs*	*Factor 2* *Economies of Small-scale Production*	*Factor 3* *Quality and Skills*
1. *Specialisation*	0.86		
2. *Lower Costs for Monitoring Workers*	0.82		
3. *Lower Costs associated with Contracting*	0.75		
4. *Shock Absorber*		0.93	
5. *Lower Wages*		0.78	
6. *Special Skills*			0.93
7. *Better Products*	0.61		0.70
Eigen Value	2.99	1.48	1.13
Percentage of Variance Explained (%)	42.7	21.2	16.2
Cumulative Percentage (%)	42.7	63.9	80.1
Number of Sample Firms = 15			

Note: Loading values are not listed if they are smaller than 0.40.
Source: Based on author's interview survey during 1999-2000.

Table 9.8 Matrix of Factor Loadings: Revealed Benefits from Subcontracting Transactions with Foreign-affiliated SMEs

Revealed Benefit Variables	Factor 1 *High Skills with Economies of Small-scale Production*	Factor 2 *High Quality with Less Internal Supervision*	Factor 3 *Specialisation and Lower Transaction Costs*
1. *Special Skills*	0.92		
2. *Shock Absorber*	0.87		
3. *Lower Wages*	0.64	0.55	
4. *Better Products*		0.84	
5. *Lower Costs for Monitoring Workers*		0.82	
6. *Lower Costs associated with Contracting*			0.93
7. *Specialisation*			0.86
Eigen Value	2.77	1.93	1.05
Percentage of Variance Explained (%)	39.6	27.5	15.0
Cumulative Percentage (%)	39.6	67.1	82.1
Number of Sample Firms = 15			

Note: Loading values are not listed if they are smaller than 0.40.
Source: Based on author's interview survey during 1999-2000.

Table 9.8 also uses factor analysis to extract three principal beneficial factors from subcontracting ties with foreign-affiliated SMEs. The three factors account for 82 percent of the total variance. The first factor, *High Skills with Economies of Small-scale Production*, explains 40 percent of the variance and consists of the variables: special skills (0.92); shock absorber (0.87); and lower wages (0.64). The second factor, *High Quality with Less Internal Supervision*, accounts for 28 percent of the total variance and comprises two variables: better products (0.84); and lower costs of monitoring workers (0.82). The last factor, *Specialisation and Lower Transaction Costs*, explains 15 percent of the variance. It includes two variables: lower costs associated with contracting (0.93) and specialisation (0.86).

9.5.3 Cost-Benefit Balance of Subcontracting Transactions with SMEs

Table 9.9 contains a rough evaluation of the cost-benefit balance of subcontracting transactions with SMEs. The parent firms rated the cost-benefit of subcontracting with local SMEs in the long-term at 3.27 on average.[7] The difference in average scores between subsectors was statistically significant at the 5 percent level. Assembler firms in the automobile and motorcycle subsectors perceived larger net benefits from subcontracting arrangements than those in the agricultural machinery and bicycle subsectors. For example, *Firm A07*, a motorcycle assembler firm, enjoyed lower wage rates based on economies of small-scale production through subcontracting transactions with local SMEs, and obtained substantial gains from vertical inter-firm linkages. On the other hand, *Firm A09* of a foreign-affiliated agricultural machinery enterprise noted that subcontracting links did not generate large benefits. Even though *Firm A09* provided various forms of support to local SMEs, it had to put up with their low quality and unreliable delivery time.

The cost-benefit of subcontracting with foreign-affiliated SMEs was rated at 3.93. Compared to local supplier firms, foreign-affiliated supplier firms have been more beneficial to the parent firms. This may reflect the fact that foreign-affiliated SMEs have usually higher technological capabilities and can provide assembler firms with reliable products and services.

[7] Our survey required parent firms to give the evaluation based on their views reflecting the situation not immediately before the interview in 1999 and 2000 but in the last 5 to 10 years.

Table 9.9 Cost-Benefit Balance of Subcontracting Transactions with SMEs

	Subcontracting with				
	Local SMEs			*Foreign SMEs*	*Comparison*
	Mean Scores	*Differences between Groups in Firm Categories*		*Mean Scores*	*Differences between*
	(I)[1]	*Subsector*[2]	*Investment*[3]	(II)[1]	(I) and (II)[4]
	(s.d.)	*t*-values	*t*-values	(s.d.)	*t*-values
Cost-Benefit Balance	3.27	2.46 *	1.04	3.93	3.57 **
	(0.70)	(-)		(0.70)	
Number of Sample Firms	15			15	

Notes: 1) Figures in the upper row are the average of scores indicated by assembler firms' rating from 1 (the lowest score as very costly) to 5 (the highest score as very beneficial). Figures in parentheses are standard deviation. (I) and (II) represent evaluation on local SMEs and on foreign-affiliated SMEs, respectively.

2) Difference in mean scores given by assembler firms in the automobile and motorcycle subsectors (AM) and by those in the agricultural machinery and bicycle subsectors (AB), which is indicated by *t*-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB firms > AM firms, (-) = AB firms < AM firms.

3) Difference in mean scores given by assembler firms of domestic investment (D) and by those of foreign investment (F), which is indicated by *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = D firms > F firms, (-) = D firms < F firms.

4) Difference in mean scores between evaluation on (I) local SMEs and on (II) foreign SMEs, which is indicated by *t*-values of paired *t*-test. ** = significant at the 1 level, * = significant at the 5 % level.

Source: Based on author's interview survey during 1999-2000.

9.6 Willingness of Parent Firms to Support SMEs in Subcontracting Transactions

The large-scale assembler firms in our sample generally regarded subcontracting with SMEs as a useful and beneficial vertical production arrangement. However, the results in Table 9.5 indicated that utilisation of SMEs through subcontracting requires principal firms to bear various costs, particularly as a consequence of insufficient technical capabilities of SMEs. If parent firms wish to make subcontracting linkages work well, they need to improve the technological and related capabilities of SMEs.

Table 9.10 Willingness to Utilise SMEs in Subcontracting Transactions in the Future

	Subcontracting with				
	Local SMEs			*Foreign SMEs*	*Comparison*
	Mean Scores	*Differences between Groups in Firm Categories*		*Mean Scores*	*Differences between*
	(I)[1]	*Subsector*[2]	*Investment*[3]	(II)[1]	(I) and (II)[4]
	(s.d.)	*t*-values	*t*-values	(s.d.)	*t*-values
Willingness to Utilise SMEs in Subcontracting	4.27	3.54 **	1.37	4.07	1.00
	(0.96)	(-)		(0.59)	
Number of Sample Firms	15			15	

Notes: 1) Figures in the upper row are the average of scores indicated by assembler firms' rating from 1 (the lowest score as not at all willing) to 5 (the highest score as very willing). Figures in parentheses are standard deviation. (I) and (II) represent evaluation on local SMEs and on foreign-affiliated SMEs, respectively.

2) Difference in mean scores given by assembler firms in the automobile and motorcycle subsectors (AM) and by those in the agricultural machinery and bicycle subsectors (AB), which is indicated by *t*-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB firms > AM firms, (-) = AB firms < AM firms.

3) Difference in mean scores given by assembler firms of domestic investment (D) and by those of foreign investment (F), which is indicated by *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = D firms > F firms, (-) = D firms < F firms.

4) Difference in mean scores between evaluation on (I) local SMEs and on (II) foreign SMEs, which is indicated by *t*-values of paired *t*-test. ** = significant at the 1 level, * = significant at the 5 % level.

Source: Based on author's interview survey during 1999-2000.

Table 9.10 shows the degree to which assembler firms are willing to involve small and medium producers as vendor firms in subcontracting deals in the future.[8] The willingness to utilise local SMEs in subcontracting business was rated high at 4.27 on average. The mean scores were significantly different at the 1 percent level between subsectors of parent firms. The automobile and motorcycle manufacturers have a stronger desire to involve local SMEs in vertical inter-firm networks than the firms producing agricultural machinery and bicycles. The willingness to use foreign-affiliated SMEs was also rated high at 4.07 on average. Though slightly lower than that of local SMEs, there was no statistically significant difference.[9]

Table 9.11 shows the extent to which parent firms made and will make an effort to support small-medium supplier firms in developing technological and other necessary capabilities in the past and in the future.[10] Efforts made by assembler firms to foster local SMEs in the past were rated at 4.27 on average. Differences in mean scores of efforts were statistically significant at the 1 percent level according to groups of subsectors and investment nationality of parent firms. LEs in the automobile and motorcycle subsectors and those with foreign participation made greater efforts to extend assistance to local SMEs than their counterparts in the agricultural machinery and bicycle subsectors and those with domestic investment.[11]

---

[8] The future here means 5 to 10 years after the date of our interview survey (in 1999-2000).

[9] The decision of course depends to a large extent on the characteristics of the products and services parent firms have to procure. However, here we generalise their willingness to utilise local and foreign-affiliated SMEs.

[10] The past and future here indicate 5 to 10 years before and after the date of the interview survey (in 1999-2000).

[11] *Firm A06* mentioned that the provision of technical and other relevant assistance to local SMEs was recognised by most foreign-affiliated assembler firms in the automobile and motorcycle subsectors as a necessary condition for the success of subcontracting deals.

Table 9.11 Efforts to Support SMEs in the Past and in the Future

	Subcontracting with				
	Local SMEs			*Foreign SMEs*	*Comparison*
	Mean Scores	*Differences between Groups in Firm Categories*		*Mean Scores*	*Differences between*
	(I)[1]	*Subsector*[2]	*Investment*[3]	(II)[1]	(I) and (II)[4]
	(s.d.)	*t*-values	*t*-values	(s.d.)	*t*-values
Efforts to Support SMEs	4.27	4.24 **	3.72 **	3.13	4.80 **
in the Past	(0.88)	(-)	(-)	(1.51)	
Efforts to Support SMEs	4.40	3.06 *	2.66 *	2.87	7.99 **
in the Future	(0.99)	(-)	(-)	(1.36)	
Number of Sample Firms	15			15	

Notes: 1) Figures in the upper row are the average of scores indicated by assembler firms' rating from 1 (the lowest score as very negative) to 5 (the highest score as very positive). Figures in parentheses are standard deviation. (I) and (II) represent evaluation on local SMEs and on foreign-affiliated SMEs, respectively.

2) Difference in mean scores given by assembler firms in the automobile and motorcycle subsectors (AM) and by those in the agricultural machinery and bicycle subsectors (AB), which is indicated by *t*-values. ** = significant at the 1 level, * = significant at the 5 % level. When the difference is significant, (+) = AB firms > AM firms, (-) = AB firms < AM firms.

3) Difference in mean scores given by assembler firms of domestic investment (D) and by those of foreign investment (F), which is indicated by *t*-values. ** = significant at the 1 % level, * = significant at the 5 % level. When the difference is significant, (+) = D firms > F firms, (-) = D firms < F firms.

4) Difference in mean scores between evaluation on (I) local SMEs and on (II) foreign SMEs, which is indicated by *t*-values of paired *t*-test. ** = significant at the 1 level, * = significant at the 5 % level.

Source: Based on author's interview survey during 1999-2000.

Past efforts to provide technical and other related support to foreign-affiliated SMEs were rated on average at 3.13. Mean scores given by the surveyed assembler firms were statistically different at 1 percent level between efforts to support local SMEs and those to assist foreign-affiliated SMEs. Assembler firms acknowledged that local SMEs needed more support than foreign-affiliated SMEs to serve well as supplier firms. This reflects the different levels of technological and other relevant capabilities of local and foreign-affiliated SMEs.

According to *Firm A01*, which has a long experience in business in Indonesia, almost all of the automobile and motorcycle assembler firms in Indonesia strongly preferred subcontracting arrangements to other vertical production alternatives, because these subsectors need a large number of high quality parts and components with good delivery timing. Thus, they have attempted, within the scope of cost-effectiveness, to foster SMEs, in particular local SMEs, to become capable vendor firms. For example, in an effort to enhance supplier firms, *Firm A01* itself, as explained above, has furnished vendor firms with a wide range of support including giving technical guidance, providing credit and guarantees for banks, and establishing local SMEs. In contrast, responses from *Firm A14* and *Firm A15* implied that both bicycle and tricycle manufacturers did not have a positive attitude to fostering small-medium supplier firms. They wanted to obtain benefits from subcontracting ties without significant effort.[12]

The extent of efforts by large-scale assembler firms to assist SMEs in the future is also shown in Table 9.11. For involving supplier firms in subcontracting chains, future efforts of parent firms to offer necessary support to local SMEs were rated at 4.40 on average. This mean score of future efforts reveals the strong need of manufacturers to purchase lower-priced intermediate inputs through subcontracting networks. It also reveals their commitments to fostering local SMEs as supplier firms in the future. The statistical tests suggest that the foreign-affiliated manufacturers and the automobile and motorcycle assembler firms plan to render support to local supplier firms more actively than their non-affiliated Indonesian and agricultural machinery and bicycle counterparts.

Future efforts to extend assistance to foreign-affiliated SMEs were assigned an average score of 2.87. The difference in mean scores between local SMEs and foreign-

[12] According to *Firm A14*, the limited capabilities of its own employees and lack of technologies are the main factors preventing the firm from deploying support activities for the development of competent vendor firms.

affiliated SMEs are statistically significant at the 1 percent level. This result shows that assembler firms perceive foreign-affiliated SMEs as immediately active players who do not need substantial support, and local SMEs as potential actors who require support, in subcontracting transactions in the long-term perspective. For example, *Firm A06*, a large-scale automotive component manufacturer, claimed that technical support provided by auto manufacturers in Indonesia to foreign-affiliated SMEs has been sufficient, and that future assistance should be focused on local supplier firms.

These results confirm a positive attitude of the respondents toward offering support to local SMEs. However, views from the principal firms indicated a recent movement toward the provision of comprehensive support only to supplier firms that have made serious efforts to improve their insufficient capabilities. For instance, *Firm A03* and *Firm A13* explained in almost a same way that they would select, from the entire number of vendor firms under them, a certain number of supplier firms that have shown steady progress in response to support. They would intensively allocate assistance only to such cost-effective SMEs.

9.7 Subcontracting Transactions and Support Mechanisms for SMEs: Evidence from Parent Firms

Based on qualitative data obtained from large-scale assembler firms, this chapter examined subcontracting transactions with and support for SMEs in the Indonesian machinery industry, particularly the automobile, motorcycle, agricultural machinery and bicycle subsectors. This section answers each of the four research questions set out in Section 9.1.

(1) Motivations for subcontracting transactions with SMEs

The principal firms in our sample considered most of the motivations listed in Table 9.3 as relevant inducements for subcontracting transactions with small-medium supplier firms. They did not expect advanced skills from local SMEs. Nor did they expect foreign-affiliated SMEs to provide a shock absorber function or to provide benefits from lower wages. However, parent firms did expect to benefit from lower wage rates and the role of shock absorber in the case of local SMEs, while foreign-affiliated SMEs were expected to deliver benefits of technological expertise and higher-quality products.

(2) Linkage types with SMEs

This case study revealed subcontracting linkages that parent firms have developed with small-medium supplier firms. Technical specifications, QC guidance and production technology through subcontracting linkages were the main forms of technical support for SMEs. Nearly half of the parent firms had transferred managerial technology, 80 percent had offered SMEs stable markets as marketing support in the form of continuous orders, 60 to 70 percent had created opportunities for SMEs to negotiate price levels and provide input materials and tools, while only 30 to 40 percent had rendered SMEs direct credits, financial guarantees and help for establishing companies.

Thus, various forms of assistance have been provided through subcontracting linkages between assembler firms and small-medium supplier firms. Technological and marketing support was more common than financial support. This is in line with Chapters 6 and 8. Assembler firms financially help SMEs through subcontracting ties by providing working capital but not fixed investment capital.

(3) Costs associated with and benefits from subcontracting transactions with SMEs

With regard to local SMEs, most of the costs and burdens listed in Table 9.5 are significant for principal firms. In particular, unstable delivery timing, low product quality coupled with low production technology, monitoring supplier firms, technical and other necessary support, and initial finding of potential SMEs were the main obstacles to conducting subcontracting business with the local SME sector.

Concerning foreign-affiliated SMEs, relatively expensive parts and components were the main cost item, while technical and other assistance was not a significant burden. The ranking of other costs was not significantly different between foreign-affiliated SMEs and local SMEs. However, except for high prices, all burdens associated with subcontracting transactions with local supplier firms were higher than with foreign-affiliated supplier firms. Parent firms wishing to exploit lower price levels of products from local SMEs need to bear other costs.

The assembler firms basically obtained most of the benefits from subcontracting listed in Table 9.6, such as specialisation, shock absorption, lower wages, better products, lower costs for monitoring own employees and lower costs associated with contracting. However, the extent of these benefits differed between local and foreign-affiliated supplier firms. Local SMEs provided parent firms with large benefits from lower wages and shock absorber function. Foreign-affiliated SMEs offered assembler firms significant benefits of high skills.

The cost-benefit balance of large-scale parent firms from subcontracting ties with supplier firms was positive. Automobile and motorcycle assembler firms perceived larger net benefits from subcontracting arrangements than their agricultural machinery and bicycle counterparts. Local SMEs have provided smaller net benefits to assembler firms than foreign-affiliated SMEs.

(4) Willingness of parent firms to support SMEs through subcontracting linkages

In the future, the large-scale assembler firms are seeking positive involvement in subcontracting chains of small-medium supplier firms. The automobile and motorcycle manufacturers indicated stronger willingness to utilise local SMEs under subcontracting networks than their agricultural machinery and bicycle counterparts.

Such willingness to involve small-medium supplier firms in subcontracting linkages leads assembler firms to a willingness to offer necessary support to local SMEs, because it seems difficult for local SMEs to play a crucial role in subcontracting without proper assistance from parent firms. In contrast, foreign-affiliated SMEs can improve capabilities by using their internal resources. The foreign-affiliated and the automobile and motorcycle assembler firms intended to render such assistance more actively than their non-affiliated Indonesian and the agricultural machinery and bicycle counterparts.

The results obtained from parent firms in this chapter are consistent with those from SMEs in Chapter 8. The types of subcontracting linkages established do not show significant differences in views between parent firms and small-medium supplier firms. This suggests that the data and information obtained from LEs and SMEs are both reliable.

UNIDO (2000: 208) reported that principal firms in the Indonesian manufacturing industry have not been induced to identify potential small-medium supplier firms, extend technical support to SMEs, and enter into long-term contracts with them. Supratikno (1998: 140) in his study of the motorcycle and diesel engine subsectors concluded that the possible contribution of subcontracting linkages to the competitiveness of assembler firms has not been significant.

In contrast, our case study of the Indonesian machinery industry has shown that subcontracting transactions with SMEs have generally allowed parent firms to obtain net benefits, although the behaviour or responses to subcontracting varied according to groups of assembler firms by subsectors and origins of investment. Assembler firms in our sample subsectors perceive foreign-affiliated SMEs as immediately active players and local SMEs as potential actors in their vertical production system. Assembler firms seek positive involvement in subcontracting chains of both types of SMEs. LEs recognise that local SMEs have insufficient technological and other capabilities, and are prepared to support such SMEs in improving their performance.

As reasons for the small benefits to LEs from subcontracting transactions with SMEs in Indonesia, UNIDO (2000: 208) pointed out insufficient design and engineering capabilities of supplier firms, while Supratikno (1998: 140) maintained that local SMEs supplied to assembler firms not main and high value components but labour-intensive and low value products. In contrast, this study found that foreign-affiliated SMEs have offered LEs special skills and better products with the use of their design and engineering capabilities and that large-scale assembler firms themselves identified cheaper products based on lower wages and labour-intensive technology as the main benefits from subcontracting transactions with local SMEs.

The results of this chapter indicated that the subcontracting systems in the studied machinery subsectors have built-in support mechanisms for the development of SMEs, in particular local SMEs. As Sato (1998a) observed in her study on the

Indonesian motorcycle component industry, subcontracting linkages and its support mechanisms for SMEs are developing in the Indonesia machinery subsectors based not on government regulations but business reasons.

Chapter 10

Conclusion:

SME Development and Subcontracting in Indonesia at Present and Japan in the Past

10.1 Introduction

This study answered several questions on the role of subcontracting in the development of small- and medium-scale enterprises in the process of economic development in contemporary Indonesia. The study was motivated by both the very limited number of comprehensive studies in this area in Indonesia and Japan's experience with SME development through subcontracting. The main questions are whether and how SMEs have contributed to economic development in Indonesia, how and why subcontracting linkages between SMEs and LEs have been (or have not been) established and developed in Indonesia, and whether and how subcontracting could be beneficial to SME development in Indonesia. In addressing these questions, this study has analysed the Indonesian manufacturing industry, particularly the machinery industry, based primarily on micro-level data and information obtained from an interview and questionnaire survey, with reference to Japan's historical experience.

This concluding chapter summarises the main findings of investigation on SMEs and subcontracting in Indonesia at present and Japan in the past. On the basis of similarities and differences between the two countries identified, this chapter concludes with some implications of our micro-level survey for more general issues on SME development through subcontracting in Indonesia.

10.2 Summary of the Main Findings: Japan in the Past and Indonesia at Present

It seems likely that some of Japan's unique cultural traits such as benevolence, loyalty and goodwill in the context of paternalistic relations enhanced its experience with SME development and subcontracting. Such aspects should be included in any attempt to draw lessons for developing economies from SME development in Japan. However, the relevance of specific cultural traits is likely to depend on the country Japan is compared with. Hence, it may be more fruitful to concentrate on the essence of Japan's historical experience with the development of SMEs through subcontracting.

Large-scale firms in the Japanese machinery industry started and resumed subcontracting transactions with SMEs in the 1930s and the first half of the 1950s, respectively. This was motivated by the rapid expansion of markets coupled with unpredictable future economic situations, scarce capital resources, a substantial wage gap between LEs and SMEs, and the development of infrastructure and technology. These conditions caused LEs to perceive purchasing from SMEs as both necessary and economical. Although SMEs did not generally have sufficient technological and other capabilities that could satisfy the needs of LEs, the latter expected that the former could improve such necessary capabilities and meet the expectations of LEs, if assistance was extended to the former. Therefore, LEs sought to foster SMEs through the provision of various forms of support. However, the intensity of cooperative relationships between LEs and SMEs depended on the stage of the development of industry and subcontracting. Support mechanisms through subcontracting linkages in the 1930s were more embryonic than those in the 1950s and after.

Continued high rates of economic growth after the mid-1950s, better access to financial sources and reduction in labour surplus inspired large-scale machinery firms in Japan to purchase parts and components from SMEs with the aim of substituting for labour, instead of capital. In addition, the modernisation of the industrial structure, rapid technological development and fierce competition in domestic and foreign markets encouraged LEs to strengthen ties with technically capable SMEs. Reflecting these changes, LEs expected that SMEs could not only offer low wage rates but would also have sufficient technology and equipment.

In the mid-1950s and the early 1960s, the rapid increase in demand for machinery and the shortage of capable SMEs urged LEs to further strengthen SMEs, by providing technical, financial and other support. These large-scale parent firms recognised that, without modernisation and rationalisation of small-medium supplier firms, subcontracting systems did not work efficiently. For this reason, large-scale machinery firms, particularly automobile assembler firms, organised vertical *keiretsu* groups, which provided a large number of SMEs with a secure outlet for their products and an opportunity to improve their technological and other capabilities.

In the 1950s and 1960s, the dual structure problem appeared as a consequence of power imbalance in subcontracting relations between SMEs and LEs. However, SMEs alleviated their subordinate relationships with LEs in the process of high growth from the early 1960s onwards. Several indicators representing economic performance by firm size in the period implied that Japan's SMEs were able to coexist with LEs, by producing a unit of output with less capital but more labour than LEs.

The proportion of subcontracting SMEs in the manufacturing industry as a whole was increasing between the mid-1960s and the early 1980s. This suggests an increasingly important role of subcontracting in the Japanese economy and SME development. The role was important particularly for machinery SMEs, because their reliance on subcontracting was more significant than in other industries.

Stable markets and technical assistance were the frequently-used and beneficial forms of support that LEs extended to SMEs. Through subcontracting linkages, parent firms were the largest external source of new technology for manufacturing SMEs. Subcontracting contributed significantly to the improvement of production efficiency of SMEs.

The main factors that enhanced the functioning of subcontracting were long-term relationships between LEs and SMEs, competition between supplier firms within a subcontracting system, technical and other support given by parent firms to SMEs, and government support in the form of an environment that facilitated the establishment of subcontracting systems.

What about Indonesia at present? Each of the core chapters of this study investigated SME development and subcontracting in the Indonesian manufacturing industry, particularly the machinery industry. Most of them used micro-level data and information obtained from our sample metalworking and machinery SMEs together with large-scale parent firms in the automobile, motorcycle, agricultural machinery and bicycle subsectors.

Based on the nation-wide data, along with LEs, SMEs in the Indonesian manufacturing industry, particularly the machinery industry, developed reasonably well in terms of output and employment growth during a decade before the recent economic crisis. The share of SMEs in value added was relatively small, but they contributed to a great extent to the Indonesian economy in terms of numbers of establishments and share in employment. The analysis of economic performance in the manufacturing industry by firm size broadly suggested that SMEs developed concurrently with LEs by way of producing a unit of output with less capital but more labour than LEs. During 1986-96, SMEs and LEs in the manufacturing industry increased labour productivity at a comparable rate. SMEs in the machinery industry recorded good growth of labour productivity and total factor productivity (TFP). The development of SMEs concurrent with LEs and the high portion of SMEs in the manufacturing industry indicated their significant contribution to economic development in Indonesia. A positive impact of subcontracting on SME development was inferred from the better performance of SMEs in the machinery sector where firms tend to have closer vertical inter-firm linkages.

Our firm-level survey with sample metalworking and machinery SMEs revealed that, among the possible external sources, inter-firm linkages (particularly subcontracting ties with LEs) were important technological and marketing support mechanisms for SME development. The usefulness of these support mechanisms in the private sector varied according to firm groups in size, ethnic affiliation and subsector categories. Large SMEs, non-*pribumi* owners and firms in the automobile and motorcycle subsectors were able to take better advantage of technical and marketing support through subcontracting linkages than smaller SMEs, *pribumi* owners and firms in the agricultural machinery and bicycle subsectors. On the other hand, smaller and *pribumi* SMEs tend to have used technical collaboration with peer firms through horizontal inter-firm linkages more frequently than their larger and non-*pribumi* SMEs.

Relative to these inter-firm linkages in the private sector, public and collective channels such as government agencies and industrial associations were not frequently utilised by SMEs to acquire technologies and develop markets. However, those public and collective channels did supplement private channels to some extent and helped particularly smaller and *pribumi* SMEs improve their technological and marketing capabilities. In contrast to these technological and marketing support mechanisms, financial support mechanisms for SMEs through inter-firm linkages did not work well.

After confirming the importance of subcontracting linkages with LEs as a source of upgrading technological and marketing capabilities of SMEs, this study sought to examine in a quantitative way whether such vertical inter-firm ties have a positive impact on productivity of SMEs. The estimation of production functions and subcontracting ratio functions together with the calculation of TFP indices suggested that vertical inter-firm cooperation through subcontracting linkages with LEs contributed to an increase in productivity of sample metalworking and machinery SMEs in Indonesia. Such subcontracting linkages proved conducive to the improvement of production efficiency. They enhanced creditworthiness and financial capabilities of SMEs. The levels of production efficiency were different between different firm groups, reflecting their uneven access to support mechanisms through subcontracting networks. Larger SMEs, non-*pribumi* SMEs and SMEs supplying parts for vehicles generally tend to have had a higher TFP than smaller SMEs, *pribumi* SMEs and SMEs producing parts for agricultural machinery and bicycles.

Then, this study looked inside the "black box" of subcontracting mechanisms, by analysing the qualitative data obtained from metalworking and machinery SMEs. Sample SMEs in Indonesia started subcontracting with LEs in order to obtain benefits such as large/stable orders, technical support, lower transactions and specialisation. For their initial contacts with LEs, metalworking and machinery SMEs often used inter-personal relationships (e.g., family, relatives and friends), peer firms in similar business lines, and former employment relationships between current parent firms and SME owners. Technological and marketing linkages were the main forms of subcontracting relationships with LEs, while financial linkages were not often established and remained limited to working capital. Subcontracting cooperation with LEs did not necessarily generate the expected degree of benefits, because they were reduced by costs associated with QCD (quality, cost and delivery timing) and difficult market circumstances. However, SMEs still obtained substantial benefits from subcontracting ties with LEs, in the areas of market provision, technical assistance, specialisation and lower transaction costs. These subcontracting linkages were generally more beneficial to SMEs with more employees, those owned by non-*pribumi* entrepreneurs, those operating in the automobile and motorcycle subsectors, those managed by owners with higher-level education and working experiences in similar subsectors, those with higher-level education of technical workers, those with longer relationships with parent firms, those with stronger trust in parent firms, those with better financial access, and those located in urban areas than their counterpart SMEs.

Finally, our study changed viewpoint and investigated subcontracting transactions with and support for SMEs from the perspective of large-scale parent firms in the automobile, motorcycle, agricultural machinery and bicycle subsectors. Sample large-scale assembler firms expected local SMEs to provide benefits of lower wage rates and a shock absorber function, while they counted on foreign-affiliated SMEs to deliver benefits of technological expertise and high-quality products. LEs provided SMEs with technological and marketing support but not financial support in a substantial way. They obtained most of the expected benefits from subcontracting with

SMEs, such as specialisation, shock absorption, lower wages, better products, lower costs for monitoring own workers and lower costs associated with contracting. Despite the existence of associated costs (e.g., unstable delivery timing, low product quality coupled with low production technology, and technical and other support), the cost-benefit balance of LEs from subcontracting with SMEs was positive. Such net benefits encouraged LEs to promote subcontracting with SMEs in the future and offer necessary support to SMEs, particularly local SMEs. In this sense, the subcontracting systems in the Indonesian machinery industry have built-in support mechanisms for SME development.

10.3 Conclusion: Implications for the Development of SMEs through Subcontracting based on a Comparison between Indonesia at Present and Japan in the Past

Our study has been aware of Japan's historical experience with SME development through subcontracting. The study of this experience did not intend to recommend copying of Japan's past experience but to establish a research framework of how to examine the development of SMEs and subcontracting in the Indonesian context and better understand those relatively new issues in Indonesia. This final section seeks to provide a synthesis of similarities and differences regarding SME development and subcontracting in Indonesia in the present and Japan in the past.

In Indonesia, SMEs in the manufacturing industry contributed significantly to economic development. In particular, the performance of SMEs in the machinery industry was remarkable. Based on our micro-level evidence in the automobile, motorcycle, agricultural machinery and bicycle subsectors, many sample metalworking and machinery SMEs without sufficient internal resources reduced technological and marketing obstacles through subcontracting collaboration with large-scale parent firms and were able to realise their potential and contribute actively to industrial and economic development. In the early 1980s, support mechanisms for SMEs through subcontracting linkages did not function well in Indonesia (Thee 1985). In the course of high growth since the mid-1980s, subcontracting in the Indonesian machinery industry has evolved. In the 1990s, subcontracting linkages with LEs worked as a major support mechanism for SMEs and helped to improve productivity of SMEs. The hypothesis of this study, that subcontracting systems in Indonesia have developed as a vertical production mode and can be beneficial to the development of SMEs, has been confirmed for the observed subsectors.

Despite the limited scope of our investigation, some common characteristics of SMEs and subcontracting have been found between Indonesia at present and Japan in the past. Subcontracting linkages with LEs generally enabled SMEs to alleviate certain constraints stemming from their limited internal resources, improve their capabilities and production efficiency, and contribute to economic development not only in Japan but also in Indonesia. The main benefits to SMEs from subcontracting ties with LEs are similar between Indonesia at present and Japan in the past.[1] The provision of technological and marketing support mechanisms and the improvement of production efficiency are the major common gains for SMEs obtained from subcontracting

[1] At the later stage of economic development, subcontracting tends to lose its usefulness and popularity. Since many SMEs become technologically and managerially capable and some of them can supply their own-brand products to markets, they may prefer to become independent producers and refrain from using any assistance from LEs. Therefore, it is necessary to note that the roles and characteristics of subcontracting in developed economies are often not same as those in developing economies. This phenomenon is observed in a decline in the proportion of subcontracting SMEs in Japan since the early 1980s. See Section 3.3.

transactions with LEs.[2] These functions generally worked well in the two countries, in firms where the levels of human resources of SME owners and employees are high, the intensity of relationships between SMEs and LEs is strong, and access to financial sources is good.

Several basic conditions and general rules concerning SMEs and subcontracting have also been identified from this study. Sufficient size of markets and rapid but unstable growth of demand are demand-side factors for the development of subcontracting.[3] In addition, the existence of SMEs that have not realised their potential to become competent supplier firms is also an important factor from the supply-side for the initiation and development of subcontracting. These conditions generally induce LEs to choose subcontracting, rather than one-off exchanges or in-house production, as a necessary and economical vertical production system and to provide SMEs with various forms of assistance such as technical and marketing support. For the decade before the recent 1997-98 crisis, the rapid growth of the Indonesian economy gave the machinery industry an impetus to develop subcontracting.

The difference in sector and subsector is an important and common factor that affects the course of the establishment and development of vertical production systems. The adaptability and importance of subcontracting production systems depend significantly on the specific characteristics of technologies in each sector or subsector such as the divisibility of production processes and quality of products. Reflecting the differences in those technological characteristics, the degree of development and

---

[2] Of course, the degree of these benefits from technical and marketing support and productivity improvement through subcontracting linkages with LEs should be different between the two countries, but cannot easily be measured in a clear manner.

[3] As Adam Smith (1970: 15-9) stated, when the market becomes large, scale economies can make specialisation through outsourcing more economical than in-house production. Odaka (1981: 172) added the speed of market expansion as another factor for promoting the division of labour. He explained that, when the market expands very quickly, LEs cannot sufficiently expand their production facilities and tend to purchase inputs from outside. Therefore, the size and speed are both important factors for subcontracting.

importance of subcontracting was different between our observed subsectors even within the same machinery sector in Indonesia and Japan. The quality of subcontracting is determined by the levels of capabilities of parent firms, which are also different according to sectors and subsectors to a certain extent. In our micro-level survey, assembler firms in the automobile and motorcycle subsectors usually have more business resources in technological, marketing, managerial and financial areas than those in the agricultural machinery and bicycle subsectors. Because of this, parent firms in the former group often provided their small-medium supplier firms with more useful support than those in the latter group.

The functioning of subcontracting is different between SMEs in different ethnic groups. Our firm-level survey in Indonesia indicated that SMEs owned by non-*pribumi* entrepreneurs took better advantage of subcontracting linkages with LEs in many cases than those by their *pribumi* counterparts. The styles of subcontracting arrangements are likely to be affected by not only economic factors but also other factors such as social and cultural specificity. Japan's *keiretsu*-type linkages were not observed as a style of subcontracting relations in Indonesia. In addition to the small market size, an ethnically heterogeneous society and weak social cohesion relative to Japan may have induced LEs in Indonesia not to form *keiretsu*-type dense subcontracting ties with SMEs but rather to establish more flexible subcontracting organisations. These non-economic factors have a certain impact on the direction of subcontracting development in each country.

The characteristics of subcontracting production systems are also affected by whether or not foreign-affiliated SMEs have a substantial influence on the manufacturing industry in each country. Our findings in Indonesia indicated that subcontracting transactions with local SMEs provided LEs with benefits of lower wages and shock absorption, while those with foreign-affiliated SMEs offered them benefits of special skills and better products. Accordingly, subcontracting tends to show different features in countries with this kind of dual structure within an economy and in those without such structure.

Legal systems, incentive programs and public technical institutions in Japan helped promote SME development through subcontracting. In Indonesia, general economic reform measures implemented since the mid-1980s have benefited SMEs to some extent. However, SME-specific policies in Indonesia have not yielded the expected fruit. Legal systems that support and promote subcontracting SMEs have not been developed well. Public technical institutions, which have been utilised by smaller SMEs and those managed by *pribumi* owners as an important source of technical information, cannot necessarily provide sufficient services to small-medium customers. The degree of effectiveness of government support in industrial and economic development is likely to generate differences in levels of SME development and subcontracting among countries.

As discussed above, this study established the validity of SME development through subcontracting in Indonesia, using micro-level evidence based on a limited number of sample SMEs in limited subsectors in the post crisis period. The micro-level survey we used allowed us to draw a detailed and comprehensive picture of SMEs and subcontracting in the observed sectors and subsectors. This methodology proved useful to understanding the features of SMEs. Further generalisation of our findings, however, would require the execution of more firm-level survey on the basis of a larger number of sample firms in more sectors and subsectors in a greater number of regions during a period of relatively stable economic situation. A nation-wide analysis on relations between the performance of SMEs and subcontracting is also preferable, if such data become available in the future. To more fully understand the relevance of subcontracting to SME development, it would be desirable to cover not only Indonesia but also several other Asian countries in this type of micro-level survey.

References

Abdullah, M. A., 2000, "Small and Medium Enterprises (SMEs): Some Pertinent Issues," in Abdullah, M. A. and M. I. B. Bakar (eds.), *Small and Medium Enterprises in Asian Pacific Countries, Volume 1: Roles and Issues*, Huntington, NY: Nova Science Publishers.

ADB, 1997, *Microenterprise Development: Not by Credit Alone*, Manila: Asian Development Bank.

Akatiga, 1999, *The Impact of Economic Crisis on Indonesian Small and Medium Enterprises*, Jakarta: Akatiga and the Asia Foundation.

Akerlof, G. A., 1984, "Gift Exchange and Efficiency-Wage Theory: Four Views," *American Economic Review*, Vol. 74, No. 2, pp. 79-83.

APEC, 1994, *The APEC Survey on Small and Medium Enterprises*, Singapore: APEC Secretariat.

Aswicahyono, H., 1998, *Total Factor Productivity in Indonesian Manufacturing, 1975-1993*, unpublished PhD Thesis, Canberra: the Australian National University.

Aswicahyono, H., M. C. Basri and H. Hill, 2000, "How not to Industrialise?: Indonesia's Automotive Industry," *Bulletin of Indonesian Economic Studies*, Vol. 36, No. 1, pp. 209-41.

Aswicahyono, H., K. Bird and H. Hill, 1996, "What Happens to Industrial Structure When Countries Liberalise?: Indonesia since the Mid-1980s," *Journal of Development Studies*, Vol. 32, No. 3, pp. 340-63.

Baranson, J., 1967, *Manufacturing Problems in India: The Cummins Diesel Experience*, New York: Syracuse University Press.

Berry, A., 1997, *SME Competitiveness: The Power of Networking and Subcontracting*, Washington D. C.: Inter-American Development Bank.

Berry A. and B. Levy, 1999, "Technical, Marketing and Financial Support for Indonesia's Small and Medium Industrial Exporters," in Levy, B., A. Berry and J. B. Nugent; with J. F. Escandon *et al.*, *Fulfilling the Export Potential of Small and Medium Firms*, Dordrecht: Kluwer Academic Publishers.

Berry, A. and D. Mazumdar, 1991, "Small-scale Industry in the Asian-Pacific Region," *Asian-Pacific Economic Literature*, Vol. 5, No. 2, pp. 35-67.

Berry, A., E. Rodriguez and H. Sandee, 2001, "Small and Medium Enterprise Dynamics in Indonesia," *Bulletin of Indonesian Economic Studies*, Vol. 37, No. 3, pp. 363-84.

Booth, A., 1998, *The Indonesian Economy in the Nineteenth and Twentieth Centuries: A History of Missed Opportunities*, New York: St. Martin's Press.

Braadbaart, O.D., 1994, *The Nuts and Bolts of Industry Growth: Textile Equipment Manufacturing in Indonesia*, Nijmegan: Catholic University of Nijmegan.

Broadbridge, S., 1966, *Industrial Dualism in Japan: A Problem of Economic Growth and Structural Change*, Chicago: Aldine Publishing.

CESS, 1999, *Studi Pola Subkontrak dalam Masa Krisis: Revisited* (The Study on Subcontracting Pattern during the Economic Crisis: Revisited)*: Final Report*, Jakarta: Center for Economic and Social Studies and SWISSCONTACT.

Chee, P. L. 1986, *Small Industry in Malaysia*, Kuala Lumpur: Berita Publishing.

Chew, S. B. 1988, *Small Firms in Singapore*, Singapore: Oxford University Press.

Christensen, L. R., D. Cummings and D. W. Jorgenson, 1981, "Relative Productivity Levels, 1947-1973: An International Comparison," *European Economic Review*, Vol. 16, No. 1, pp. 61-94.

Coase, R. H., 1937, "The Nature of the Firm," *Economica*, Vol. 4, No. 16, pp. 386-405.

Cole, W., 1998, "Bali's Garment Export Industry," in Hill, H. and K. W. Thee (eds.), *Indonesia's Technological Challenge*, Singapore: Institute of Southeast Asian Studies.

Daimon, Y., 1998, *Toyota Production System: An Integrated Approach to Just-in-Time*, Norcross, GA: Engineering & Management Press.

Denison, E. and W. Chung, 1976, *How Japan's Economy Grew So Fast: The Sources of Postwar Expansion*, Washington D.C.: Brookings Institution.

Dhanani, S. and S. A. Hasnain, 2002, "The Impact of Foreign Direct Investment on Indonesia's Manufacturing Sector," *Journal of the Asia Pacific Economy*, Vol. 7, No. 1, pp. 61-94.

Dore, R., 1987, *Taking Japan Seriously: A Confucian Perspective on Leading Economic Issues*, London: Athlone Press.

Economic Planning Agency (EPA), 1957, *Keizai Hakusho 1957* (Annual Report on the Japanese Economy or Economic White Paper, 1957), Tokyo: Government Printing Office.

Erfanie, S., 1985, "Pengembangan Industri Perakit dengan Sistem Subkontraktor: Suatu Studi Kasus tentang Perusahaan Subkontraktor di Daerah Tegal" (The Development of the Assembly Industry with Subcontracting System: A Case Study on Subcontractor Firms in Tegal), *Masyarakat Indonesia*, Vol. 12, No. 3, pp. 275-88.

Friedman, D., 1988, *The Misunderstood Miracle: Industrial Development and Political Change in Japan*, Ithaca: Cornell University Press.

Fujita, K., 1954, "Nihon Chusho Kogyo to Shitauke-sei no Honshitsu" (Japanese Small- and Medium-scale Industry and the Essence of Subcontracting), in Fujita, K. and T. Itoh (eds.), *Chusho Kogyo no Honshitsu* (the Essence of Small- and Medium-scale Industry), Tokyo: Yuhikaku.

Fujita, K., 1965, *Nihon Sangyo Kozo to Chusho Kigyo: Shitauke-sei Kogyo wo Chushin ni shite* (Industrial Structure in Japan and Small- and Medium-scale Enterprises: with Special Attention to Subcontracting), Tokyo: Iwanami Shoten.

Fujita, K. and R. C. Hill, 1997, "Auto Industrialization in Southeast Asia: National Strategies and Local Development," *ASEAN Economic Bulletin*, Vol. 13, No. 3, pp. 312-32.

Fukumoto, M., 1999, "Development Policies for Small and Medium Enterprises in APEC: In the Case of the Philippines," in Okuda, S. (ed.), *Trade Liberalization and Facilitation in APEC: A Re-evaluation of APEC Activities*, Tokyo: Institute of Developing Economies.

Goeltom, M. S., 1995, *Indonesia's Financial Liberalization: An Empirical Analysis of 1981-88 Panel Data*, Singapore: Institute of Southeast Asian Studies.

Goeltom, M. S., 1997, "Development and Challenges of the Machinery Industry in Indonesia," in Pangestu, M. and Y. Sato (eds.), *Waves of Change in Indonesia's Manufacturing Industry*, Tokyo: Institute of Developing Economies.

Griliches, Z. and V. Ringstad, 1971, *Economies of Scale and the Form of the Production Function: An Econometric Study of Norwegian Manufacturing Establishment Data*, Amsterdam: North-Holland.

Hamid, A., 1985, "Pengembangan Industri Komponen melalui Kaitan Vertikal: Studi Kasus tentang Perusahaan Perakit Mesin Diesel" (The Development of the Component Industry through Vertical Linkages: A Case Study on Diesel Machinery Firms), *Masyarakat Indonesia*, Vol. 12, No. 3, pp. 233-51.

Harianto, F., 1996, "Study on Subcontracting in Indonesian Domestic Firms," in M. Pangestu (ed.), *Small-scale Business Development and Competition Policy*, Jakarta: Centre for Strategic and International Studies.

Hayami, Y., 1997, *Development Economics: From the Poverty to the Wealth of Nations*, New York: Oxford University Press.

Hayami, Y., 1998, "Toward an Alternative Path of Economic Development: An Introduction," in Hayami, Y. (ed.), *Toward the Rural-based Development of Commerce and Industry: Selected Experiences from East Asia*, Washington, D.C.: World Bank.

Hayami, Y., M. Kikuchi and E. B. Marciano, 1998, "Structure of Rural-based Industrialization: Metal Craft Manufacturing on the Outskirts of Greater Manila, the Philippines," *Developing Economies*, Vol. 36, No. 2, pp. 132-54.

Hayashi, M, 1996, *Structural Changes in the Indonesian Industry and Trade*, IDCJ Working Paper Series No. 52, Tokyo: International Development Center of Japan.

Higgins, B., 1959, *Economic Development: Problems, Principles, and Policies*, New York: W. W. Norton.

Hill, H., 1983, "Choice of Technique in the Indonesian Weaving Industry," *Economic Development and Cultural Change*, Vol. 31, No. 2, pp. 337-53.

Hill, H., 1985, "Subcontracting, Technological Diffusion, and the Development of Small Enterprise in Philippine Manufacturing," *Journal of Developing Areas*, Vol.19, No. 2, pp. 245-62.

Hill, H., 1988, *Foreign Investment and Industrialization in Indonesia*, New York: Oxford University Press.

Hill, H., 1992, "Manufacturing Industry," in Booth, A. (ed.), *The Oil Boom and After: Indonesian Economic Policy and Performance in the Soeharto Era*, Oxford: Oxford University Press.

Hill, H., 1996, *The Indonesian Economy since 1966: Southeast Asia's Emerging Giant*, Cambridge: Cambridge University Press.

Hill, H., 1997, *Indonesia's Industrial Transformation*, Singapore: Institute of Southeast Asian Studies.

Hill, H., 2001, "Small and Medium Enterprises in Indonesia: Old Policy Challenges for a New Administration," *Asian Survey*, Vol. 41, No. 2, pp. 248-70.

Hondai, S., 1992, *Dai-kigyo to Chusho-kigyo no Doji Seicho: Kigyo-kan Bungyo no Bunseki* (The Simultaneous Growth of Large- and Small/Medium-scale Firms: Analysis of Inter-firm Specialisation), Tokyo: Dobunkan.

Hondai, S., 1995, "Increasing the Productivity of Small and Medium-scale Enterprises: A Study of Japan's Experiences," in Park, E. Y. (ed.), *Small and Medium-sized Enterprises and Economic Development*, Seoul: Korea Development Institute.

Hondai, S. and A. Murakami, 1996, *Organizational Arrangements of Production among Small- and Medium-scale Enterprises in Japan and Indonesia*, Kobe: APEC Study Center, Kobe University and Institute of Developing Economies.

Hoong, S. S. 1992, "Enhancing Technological Linkages through the Ancillary and Support Industry," in Salleh, I. M. and L. Rahim (eds.), *Enhancing Intra-Industry Linkages: The Role of Small and Medium Scale Industries*, Kuala Lumpur: Institute of Strategic and International Studies.

ILO, 1999, *Indonesia Employment Strategy Mission: Aide Memoire*, Jakarta: International Labour Organization.

Ito, T. and K. Orii, 2000, "Toward Constructing an Asian Manufacturing Database: Thailand and Indonesia," in Odaka, K., Y. Kiyokawa and M. Kuboniwa (eds.), *Constructing a Historical Macroeconomic Database for Trans-Asian Regions: International Research Workshop on the Asian Historical Statistics Database: An Appraisal of Project Outcomes and Future Research Directions*, Tokyo: Hitotsubashi University, Institute of Economic Research.

Itoh, M. and S. Urata, 1998, "Upgrading Technological Capabilities of Small and Medium Size Enterprises: Public and Private Support in the Japanese and Korean Auto Parts Industries," in Hayami, Y. and M. Aoki (eds.), *The Institutional Foundations of East Asian Economic Development: Proceedings of the IEA Conference Held in Tokyo, Japan*, New York: St. Martin's Press.

Japan Overseas Enterprises Association, 1994, *Supporting Industry no Kenkyu* (Research on Supporting Industry), Tokyo: Japan Overseas Enterprises Association.

JICA, 1995, *The Study on Industrial Sector Development: Supporting Industries in the Kingdom of Thailand*, Tokyo: Japan International Cooperation Agency.

JICA, 1997, *The Study on the Development of Supporting Industries in the Republic of Indonesia: Main Report*, Tokyo: Japan International Cooperation Agency.

JICA, 1999, *The Follow-up Study on the Development of Supporting Industries in the Republic of Indonesia*, Tokyo: Japan International Cooperation Agency.

Joskow, P. L., 1985, "Vertical Integration and Long-term Contracts: The Case of Coal-burning Electric Generating Plants," *Journal of Law, Economics, and Organization*, Vol. 1, No. 1, pp. 33-80.

JSBRI, 1998, *Asia Chusho Kigyo no Genjyo ni kansuru Chosa Kenkyu* (A Study on the Present Conditions of Asian SMEs), Tokyo: Japan Small Business Research Institute.

JSBRI, 1999a, *Asia Chusho Kigyo no Genjyo ni kansuru Chosa Kenkyu: Kankoku* (A Study on the Present Conditions of Asian SMEs: Korea), Tokyo: Japan Small Business Research Institute.

JSBRI, 1999b, *Asia Chusho Kigyo no Genjyo ni kansuru Chosa Kenkyu: Taiwan* (A Study on the Present Conditions of Asian SMEs: Taiwan), Tokyo: Japan Small Business Research Institute.

JSBRI, 1999c, *Asia Chusho Kigyo no Genjyo ni kansuru Chosa Kenkyu: Thai* (A Study on the Present Conditions of Asian SMEs: Thailand), Tokyo: Japan Small Business Research Institute.

Kalirajan, K. P., M. B. Obwona and S. Zhao, 1996, "A Decomposition of Total Factor Productivity Growth: The Case of Chinese Agricultural Growth before and after Reforms," *American Journal of Agricultural Economics*, Vol. 78, No. 2, pp. 331-8.

Kamiyama, K., H. Ueda, T. Oshima and M. Ikeda, 1995, "Jidosha Sangyo" (the Automobile Industry), in Sangyo Gakkai (ed.), *Sengo Nihon Sangyo-shi* (History of Japanese Industry after-World War II), Tokyo: Toyo Keizai Shinposha.

Kelley, A. and J. Williamson, 1974, *Lessons from Japanese Development: An Analytical Economic History*, Chicago: University of Chicago Press.

Kim, L. and J. B. Nugent, 1999, "Korean SMEs and Their Support Mechanisms," in Levy, B., A. Berry and J. B. Nugent; with J. F. Escandon *et al.*, *Fulfilling the Export Potential of Small and Medium Firms*, Dordrecht: Kluwer Academic Publishers.

Kiyonari, T., 1997, *Chusho Kigyo Dokuhon* (Readings in Small- and Medium-scale Enterprises), Tokyo: Toyo Keizai Shinposha.

Kojima, S. and Y. Okada, 1997, *Catching Up to Leadership: The Role of Technology-Support Institutions in Japan's Casting Sector*, Washington D. C.: World Bank.

Komiyama, T., 1941, *Nihon Chusho Kogyo Kenkyu* (A Study on Small- and Medium-scale Industry in Japan), Tokyo: Chuo Koronsha.

Kosai, Y., 1994, "Nijyu Kozo Ron" (The Dual Structure Thesis), in Arisawa, H. *et al.* (eds.), *Showa Keizai-shi: 2* (Economic History in the Showa Period: Vol. 2), Tokyo: Nihon Keizai Shinbunsha.

Kosai, Y. and J. Teranishi, 1993, "Sengo no Keizai Kaikaku to Anteika Seisaku" (Economic Reform and Stabilization in Postwar Japan), in Kosai, Y. and J. Teranishi (eds.), *Sengo Nihon no Keizai Kaikaku* (The Japanese Experience of Economic Reforms), Tokyo: University of Tokyo Press.

Kuroda, M., 1993, "Senzen Infure-ki ni okeru Bukka Busshi Tosei" (Price and Goods Control in the Japanese Postwar Inflationary Period), in Kosai, Y. and J. Teranishi (eds.), *Sengo Nihon no Keizai Kaikaku* (The Japanese Experience of Economic Reforms), Tokyo: University of Tokyo Press.

Lall, S., 1980, "Vertical Inter-firm Linkages in LDCs: An Empirical Study," *Oxford Bulletin of Economics and Statistics*, Vol. 42, No. 3, pp. 203-26.

Landes, D., 1965, "Japan and Europe: Contrasts in Industrialization," in Lockwood, W. (ed.), *The State and Economic Enterprise in Japan: Essays in the Political Economy of Growth*, Princeton, N.J.: Princeton University Press.

Levy, B., A. Berry, J. B. Nugent; with J. F. Escandon *et al.*, 1999, *Fulfilling the Export Potential of Small and Medium Firms*, Dordrecht: Kluwer Academic Publishers.

Levy, B., A. Berry and J. B. Nugent, 1999, "Supporting the Export Activities of Small and Medium Enterprise (SME)," in Levy, B., A. Berry and J. B. Nugent; with J. F. Escandon *et al.*, *Fulfilling the Export Potential of Small and Medium Firms*, Dordrecht: Kluwer Academic Publishers.

Li, L. P., 1992, "Mechanism for Developing Linkages between SMIs and LSIs: Subcontracting Arrangements," in Salleh, I. M. and L. Rahim (eds.), *Enhancing Intra-Industry Linkages: The Role of Small and Medium Scale Industries*, Kuala Lumpur: Institute of Strategic and International Studies.

Liao, H. and Y. Kao, 1995, "The Development of Small and Medium-sized Enterprises in Chinese Taipei," in Park, E. Y. (ed.), *Small and Medium-sized Enterprises and Economic Development*, Seoul: Korea Development Institute.

Little, I. M. D., 1988, "Small Manufacturing Enterprises and Employment in Developing Countries," *Asian Development Review*, Vol. 6, No. 2, pp. 1-9.

Little, I. M. D., D. Mazumdar and J. M. Page, Jr., 1987, *Small Manufacturing Enterprises: A Comparative Study of India and Other Economies*, New York: Oxford University Press.

Lockwood, W. (ed.), 1965, *The State and Economic Enterprise in Japan: Essays in the Political Economy of Growth*, Princeton, N.J.: Princeton University Press.

Marsden, K., 1984, "Services for Small Firms: The Roles of Government Programmes and Market Networks in Thailand," *International Labour Review*, Vol. 123, No. 2, pp. 235-49.

Mazumdar, D., 2001, *Small-Medium Enterprise Development in Equitable Growth and Poverty Alleviation*, Manila: ADB.

McLeod, R. H., 1991, "Informal and Formal Sector Finance in Indonesia: The Financial Evolution of Small Businesses," *Savings and Development*, Vol. 15, No. 2, pp. 187-209.

McMillan, J., 1990, "Managing Suppliers: Incentive Systems in Japanese and U.S. Industry," *California Management Review*, Vol. 32, No. 4, pp. 38-55.

Mead, D., 1984, "Of Contracts and Subcontracts: Small Firms in Vertically Dis-integrated Production/Distribution Systems in LDCs," *World Development*, Vol. 12, No. 11/12, pp. 1095-106.

Minami, R., 1973, *The Turning Point in Economic Development: Japan's Experience*, Tokyo: Kinokuniya.

Minami, R., 1994, *The Economic Development of Japan: A Quantitative Study*, New York: St. Martin's Press.

Ministry of International Trade and Industry (MITI), 1961, *Kogyo Tokei 50-nen-shi* (A History of the Census of Manufactures for 1909-1958), Tokyo: Government Printing Office.

Ministry of International Trade and Industry (MITI), 1990, *Tsusho Sangyo Seisakushi Vol. 6* (A History of Japanese Trade and Industry Policy, Vol. 6), Tokyo: Tsusho Sangyo Chosakai.

Ministry of International Trade and Industry (MITI), 1991, *Tsusho Sangyo Seisakushi Vol. 7* (A History of Japanese Trade and Industry Policy, Vol. 7), Tokyo: Tsusho Sangyo Chosakai.

Ministry of International Trade and Industry (MITI), 1992, *Tsusho Sangyo Seisakushi Vol. 16* (A History of Japanese Trade and Industry Policy, Vol. 16), Tokyo: Tsusho Sangyo Chosakai.

Ministry of International Trade and Industry (MITI), 1993, *Tsusho Sangyo Seisakushi Vol. 11* (A History of Japanese Trade and Industry Policy, Vol. 11), Tokyo: Tsusho Sangyo Chosakai.

Ministry of International Trade and Industry (MITI), 1994, *Tsusho Sangyo Seisakushi Vol. 1* (A History of Japanese Trade and Industry Policy, Vol. 1), Tokyo: Tsusho Sangyo Chosakai.

Mishina, T., 1962, "Kikai Kogyo ni okeru Chusho Kigyo no Saihen Katei" (Restructuring Process of SMEs in the Machinery Manufacturing), in Oshikawa, I., I. Nakayama, H. Arisawa and K. Isobe (eds.), *Dai 2-ji Chusho Kigyo Kenkyu III: Kodo Seicho Katei ni okeru Chusho Kigyo no Kozo Henka* (The Second Research on SMEs III: Structural Changes in SMEs in the Process of High Economic Growth), Tokyo: Toyo Keizai Shinposha.

Mizuno, K., 1996, *Rural Industrialization in Indonesia: A Case Study of Community-based Weaving Industry in West Java*, Tokyo: Institute of Developing Economies.

Morris-Suzuki, T., 1994, *The Technological Transformation of Japan: From the Seventeenth to the Twenty-first Century*, New York: Oxford University Press.

Motai, S. and K. Ohkawa, 1978, *Small-scale Industries: A Study on Japan's 1966 Manufacturing Census*, IDCJ Working Paper Series No. 11, Tokyo: International Development Center of Japan.

Murakami, N., D. Liu and K. Otsuka, 1996, "Market Reform, Division of Labor, and Increasing Advantage of Small-scale Enterprises: The Case of the Machine Tool Industry in China," *Journal of Competitive Economics*, Vol. 23, No. 3, pp. 256-77.

Nabi, I., 1985, *Subcontracting and Industrialization in Developing Countries*, Economic Growth Center Discussion Paper No. 481, New Haven, CT: Yale University.

Nakajima, S., 1994, *Introduction to TPM*, Portland, OR: Productivity Press.

Nakamura, H., 1994, "Chusho Kigyo no Henbo" (Changes in Small- and Medium-scale Enterprises), in Arisawa, H. *et al.* (eds.), *Showa Keizai-shi: 2* (Economic History in the Showa Period: Vol. 2), Tokyo: Nihon Keizai Shinbunsha.

Nakamura, Takafusa, 1983, *Economic Growth in Prewar Japan*, New Haven: Yale University Press.

Nakamura, Tsutomu, 1983, *Chusho Kigyo to Dai Kigyo: Nihon no Sangyo Hatten to Jyun-suichoku-teki Togo* (Small- and Medium-scale Enterprises and Large-scale Enterprises: Industrial Development in Japan and Quasi-vertical Integration), Tokyo: Toyo Keizai Shinposha.

Neuman, A., 1955, *Industrial Development in Indonesia*, Cambridge: Students' Bookshops.

Nishiguchi, T., 1994, *Strategic Industrial Sourcing: The Japanese Advantage*, New York: Oxford University.

Nishiguchi, T. and J. Brookfield, 1997, "The Evolution of Japanese Subcontracting," *Sloan Management Review*, Vol. 39, No. 1, pp. 89-101.

Nishikawa, S., 1996, *Nihon Keizai no Seicho-shi* (A History of Japan's Economic Growth), Tokyo: Toyo Keizai Shinposha.

Odaka, K., 1978, "Shitauke-sei Kikai Kogyo-ron Jyosetsu" (Some Observations on the Role of Subcontracting Firms in the Development of Machinery Industry), *Keizai Kenkyu* (Economic Review), Vol. 29, No. 3, pp. 243-50.

Odaka, K., 1981, "Senkan-ki ni okeru Shitauke-sei Kikai-buhin Kogyo Hattatsu no Sho-yoin" (Some Factors for the Development of Subcontracting Machinery Parts Industry during the Interwar Period), in Nakamura, T. (ed.), *Senkan-ki no Nihon Keizai Bunseki* (Analysis on the Interwar Japanese Economy), Tokyo: Yamakawa.

Odaka, K., 1983, "Jidosha Kogyo Buhin no Hatten to Teitai: Nihon to Tonan-Asia Shokoku no Keiken wo Megutte" (The Growth and Stagnation of the Automobile Components Industry: Experiences of Japan and South East Asian Countries), *Keizai Kenkyu* (Economic Review), Vol. 34, No. 4, pp. 337-59.

Odaka, K., 1984, *Rodo Shijo Bunseki* (Analysis of Labour Market), Tokyo: Iwanami Shoten.

Odaka, K., 1985, "Is the Division of Labor Limited by the Extent of the Market?: A Study of Automobile Parts Production in East and Southeast Asia," in Ohkawa, K. and G. Ranis (eds.), *Japan and the Developing Countries: A Comparative Analysis*, New York: Basil Blackwell.

Odaka, K., 1996, "Kishin Ho to Jidosha Buhin: Kodo Seichoki Chokuzen ni okeru Sangyo Seisaku no Keizaiteki Koka ni tsuite" (The Provisional Act to Promote Machinery Industry and Auto Parts Production in Postwar Japan: Economic Evaluation of an Industrial Policy), *Keizai Kenkyu* (Economic Review), Vol. 47, No. 4, pp. 340-56.

Odaka, K., K. Ono and F. Adachi, 1988, *The Automobile Industry in Japan: A Study of Ancillary Firm Development*, Tokyo: Kinokuniya.

Ohkawa, K., 1976, *Keizai Hatten to Nihon no Keiken* (Economic Development and Japan's Experience), Tokyo: Taimei-do.

Ohkawa, K., 1993, *Growth Mechanism of Developing Economies: Investment, Productivity and Employment*, Tokyo: International Development Center of Japan.

Ohkawa, K. and H. Kohama, 1989, *Lectures on Developing Economies: Japan's Experience and Its Relevance*, Tokyo: University of Tokyo Press.

Ohkawa, K. and G. Ranis (eds.), 1985, *Japan and the Developing Countries: A Comparative Analysis*, New York: Basil Blackwell.

Ohkawa, K. and H. Rosovsky, 1973, *Japanese Economic Growth: Trends Acceleration in the Twentieth Century*, Stanford: Stanford University Press.

Ohkawa, K. and M. Tajima, 1976, *Small-Medium Scale Manufacturing Industry: A Comparative Study of Japan and Developing Nations*, IDCJ Working Paper Series No. A-02, Tokyo: International Development Center of Japan.

Ohkawa, K., N. Takamatsu and Y. Yamamoto, 1974, *Estimates of Long-term Economic Statistics of Japan since 1868: Vol. 1 National Income*, Tokyo: Toyo Keizai Shinposha.

Okazaki, T. and H. Yoshikawa, 1993, "Sengo Inflation to Dodge Line" (Postwar Hyper-Inflation and the Dodge Plan, 1945-50: an Overview), in Kosai, Y. and J. Teranishi (eds.), *Sengo Nihon no Keizai Kaikaku* (The Japanese Experience of Economic Reforms), Tokyo: University of Tokyo Press.

Okumura, H., 1995, "Sengo Nihon no Sangyo to Kinyu" (Industry and Finance in Postwar Japan), in Sangyo Gakkai (ed.), *Sengo Nihon Sangyo-shi* (History of Japanese Industry after World War II), Tokyo: Keizai Shinposha.

Okumura, S., 1960, "Jidosha Kogyo no Hatten Dankai to Kozo" (Development Stage and Structure of the Automobile Industry), in Sakisaka, M. (ed.), *Gendai Nihon*

Sangyo Koza: V (Lectures on Modern Industry in Japan: Vol. 5), Tokyo: Iwanami Shoten.

Osada, H., 1994, "Trade Liberalization and FDI Incentives in Indonesia: The Impact on Industrial Productivity," *Developing Economies*, Vol. 32, No. 4, pp. 479-91.

Osada, T., 1991, *The 5S's: Five Keys to a Total Quality Environment*, Tokyo: Asian Productivity Organization.

Oshima, H. T., 1987, *Economic Growth in Monsoon Asia: A Comparative Survey*, Tokyo: University of Tokyo Press.

Otsuka, K., 1998, "Rural Industrialization in East Asia," in Hayami, Y. and M. Aoki (eds.), *The Institutional Foundations of East Asian Economic Development: proceedings of the IEA Conference held in Tokyo, Japan*, New York: St. Martin's Press.

Paauw, D. S., 1963, "From Colonial to Guided Economy," in McVey, R. T. (ed.), *Indonesia*, New Heaven: Human Relations Area Files.

Palmer, I. and L. Castles, 1971, "The Textile Industry," in Glassburner, B. (ed.), *The Economy of Indonesia: Selected Readings*, Ithaca: Cornell University Press.

Pangestu, M., 1996, *Economic Reform, Deregulation and Privatisation: The Indonesian Experience*, Jakarta: Centre for Strategic and International Studies.

Park, E. Y. (ed.), 1995, *Small and Medium-sized Enterprises and Economic Development*, Seoul: Korea Development Institute.

Patten, R. H., J. K. Rosengard and D. E. Johnston, Jr., 2001, "Microfinance Success amidst Macroeconomic Failure: The Experience of Bank Rakyat Indonesia during the East Asian Crisis," *World Development*, Vol. 29, No. 6, pp. 1057-69.

Pilat, D., 1993, "The Sectoral Productivity Performance of Japan and the U.S., 1885-1990," *Review of Income and Wealth*, Vol. 39, No. 4, pp. 357-75.

Pilat, D., 1994, *The Economics of Rapid Growth: The Experience of Japan and Korea*, Aldershot: Edward Elgar.

Piore, M., 1990, "United States of America," in Sengenberger, W., G. Loveman and M. Piore (eds.), *The Re-emergence of Small Enterprises: Industrial Restructuring in Industrialised Countries*, Geneva: International Labour Organisation.

Rabellotti, R. and H. Schmitz, 1997, *The Internal Heterogeneity of Industrial Districts in Italy, Brazil and Mexico*, IDS Working Paper 59, Brighton: Institute of Development Studies, University of Sussex.

Romijn, H. A., 1987, "Employment Generation through Cottage Industries in Rural Thailand: Potentials and Constraints," in Islam, R. (ed.), *Rural Industrialisation and Employment in Asia*, New Delhi: ILO-ARTEP.

Sako, M., 1992, *Prices, Quality and Trust: Inter-firm Relations in Britain and Japan*, New York: Cambridge University Press.

Sandee, H., R. K. Andadari and S. Sulandjari, 2000, "Small Firm Development during Good Times and Bad: the Jepara Furniture Industry," in Manning, C. and P. van Diermen (eds.), *Indonesia in Transition: Social Aspects of Reformasi and Crisis*, Singapore: Institute of Southeast Asian Studies.

Sato, Y., 1998a, "The Machinery Component Industry in Indonesia: Emerging Subcontracting Networks," in Sato, Y. (ed.), *Changing Industrial Structures and Business Strategies in Indonesia*, Tokyo: Institute of Developing Economies.

Sato, Y., 1998b, "The Transfer of Japanese Management Technology to Indonesia," in Hill, H. and Thee K. W. (eds.), *Indonesia's Technological Challenge*, Singapore: Institute of Southeast Asian Studies.

Sato, Y., 2000a, "Linkage Formation by Small Firms: The Case of a Rural Cluster in Indonesia," *Bulletin of Indonesian Economic Studies*, Vol. 36, No. 1, pp. 137-66.

Sato, Y., 2000b, "How did the Crisis Affect Small and Medium-sized Enterprises?: from a Field Study of the Metal-working Industry in Java," *Developing Economies*, Vol. 38, No. 4, pp. 572-95.

Schmitz, H., 1982, "Growth Constraints on Small-scale Manufacturing in Developing Countries: A Critical review," *World Development*, Vol. 10, No. 6, pp. 429-50.

Schmitz, H., 1995, "Collective Efficiency: Growth Path for Small-scale Industry," *Journal of Development Studies*, Vol. 31, No. 4, pp. 529-66.

Segers, W., 1988, *Changing Economy in Indonesia: A Selection of Statistical Sources Material from the Early 19th Century up to 1940, Vol. 8: Manufacturing Industry 1870-1942*, The Hague: M. Nijhoff.

Seong, S., 1995, "Small and Medium-sized Enterprises and the Structural Adjustment of the Korean Economy," in Park, E. Y. (ed.), *Small and Medium-sized Enterprises and Economic Development*, Seoul: Korea Development Institute.

Shaolian, L., 2000, "The Development of Small and Medium-scaled Rural Enterprises in China," in Abdullah, M. A. and M. I. B. Bakar (eds.), *Small and Medium Enterprises in Asian Pacific Countries, Volume 1: Roles and Issues*, Huntington, NY: Nova Science Publishers.

Shinohara, M., 1972, *Estimates of Long-term Economic Statistics of Japan since 1868: Vol. 10 Mining and Manufacturing*, Tokyo: Toyo Keizai Shinposha.

Siddharthan, N. S., 1998, "Differential Behaviour of the Japanese Affiliates in the Indian Automobile Sector," *Japan and the World Economy*, Vol. 10, No. 1, pp. 97-109.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1967, *Chusho Kigyo Hakusho* (White Paper on Small and Medium Enterprises in Japan), Tokyo: Government Printing Office.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1974, *Dai 4-kai Kogyo Jittai Kihon Chosa Hokokusho: 1971* (4th Basic Survey of Actual Situations of the Manufacturing Sector: 1971), Tokyo: Ministry of International Trade and Industry.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1977, *Chusho Kigyo Hakusho* (White Paper on Small and Medium Enterprises in Japan), Tokyo: Government Printing Office.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1979, *Dai 5-kai Kogyo Jittai Kihon Chosa Hokokusho: 1976* (5th Basic Survey of Actual Situations of the Manufacturing Sector: 1976), Tokyo: Ministry of International Trade and Industry.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1980, *Chusho Kigyo Hakusho* (White Paper on Small and Medium Enterprises in Japan), Tokyo: Government Printing Office.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1983, *Chusho Kigyo Hakusho* (White Paper on Small and Medium Enterprises in Japan), Tokyo: Government Printing Office.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1985, *Chusho Kigyo Hakusho* (White Paper on Small and Medium Enterprises in Japan), Tokyo: Government Printing Office.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1993, *Chusho Kigyo Hakusho* (White Paper on Small and Medium Enterprises in Japan), Tokyo: Government Printing Office.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 1998, *Chusho Kigyo Hakusho* (White Paper on Small and Medium Enterprises in Japan), Tokyo: Government Printing Office.

Small and Medium Enterprise Agency, Ministry of International Trade and Industry, 2000, *Chusho Kigyo Hakusho* (White Paper on Small and Medium Enterprises in Japan), Tokyo: Government Printing Office.

Smith, A., 1970, *The Wealth of Nations*: with Introduction by Seligman, E. R. A., London: Dent.

Soehoed, A. R., 1967, "Manufacturing in Indonesia," *Bulletin of Indonesian Economic Studies*, No. 8, pp. 65-84.

Staley, E. and R. Morse, 1965, *Modern Small Industry for Developing Countries*, New York: McGraw Hill.

Stigler, G. J., 1951, "The Division of Labor is Limited by the Extent of the Market," *Journal of Political Economy*, Vol. 59, No. 3, pp. 185-93.

Sudjono, R. A., 1985, "Pengembangan Sistem Subkontraktor di Indonesia: Studi Kasus tentang Perusahaan Subkontraktor di Daerah Surakarta dan Klaten" (The Development of the Subcontracting System in Indonesia: A Case Study on Subcontractor Firms in Surakarta and Klaten), *Masyarakat Indonesia*, Vol. 12, No. 3, pp. 253-74.

Supratikno, H., 1998, *Competitive Strategy, Production Organization and Inter-firm Collaboration: A Case Study of Subcontracting Arrangements in Three Manufacturing Firms in Indonesia*, Amsterdam: Vrije Universiteit.

Tajima, M., 1978, *Small-Medium Scale Manufacturing Industry: Further Discussion in a Comparative Study of Japan and Developing Nations*, IDCJ Working Paper Series No. 8, Tokyo: International Development Center of Japan.

Takahashi, Y. and T. Osada, 1990, *TPM*, Tokyo: Asian Productivity Organization.

Takeuchi, J., 1991, *The Role of Labour-intensive Sectors in Japanese Industrialization*, Tokyo: United Nations University Press.

Takeuchi, M., 1962, "Soron" (General Remarks), in Oshikawa, I., I. Nakayama, H. Arisawa and K. Isobe (eds.), *Dai 2-ji Chusho Kigyo Kenkyu III: Kodo Seicho Katei ni okeru Chusho Kigyo no Kozo Henka* (The Second Research on SMEs III: Structural Changes in SMEs in the Process of High Economic Growth), Tokyo: Toyo Keizai Shinposha.

Tambunan, T. T. H., 2000, *Development of Small-scale Industries during the New Order Government in Indonesia*, Aldershot: Ashgate.

Tasugi, K., 1941, *Shitaukesei Kogyoron: Keizai Hatten Katei ni okeru Chusho Kogyo* (Theory of Industrialisation through Subcontracting System: Small- and Medium-scale Industry in the Process of Economic Development), Tokyo: Yuhikaku.

Teranishi, J., 1993, "Shusen Chokugo ni okeru Kinyuseido Kaikaku" (Financial Sector Reform after the War), in Kosai, Y. and J. Teranishi (eds.), *Sengo Nihon no Keizai Kaikaku* (The Japanese Experience of Economic Reforms), Tokyo: University of Tokyo Press.

Thee, K. W., 1985, "Kaitan-Kaitan Vertikal Antar Perusahaan dan Pengembangan Sistem Subkontraktor di Indonesia: Beberapa Hasil Studi Permulaan (Vertical Inter-firm Linkages and the Development of the Subcontracting System in Indonesia: Some Case Studies)," *Masyarakat Indonesia*, Vol. 12, No. 3, pp. 219-31.

Thee, K. W., 1989, "Industrialisation in India and Indonesia," *Itinerario*, Vol. 13, No. 1, pp. 133-54.

Thee, K. W., 1994, "Indonesia," in Meyanathan, S. D. (ed.), *Industrial Structures and the Development of Small and Medium Enterprise Linkages: Examples from East Asia*, Washington, D.C.: World Bank.

Thee, K. W., 1997, "The Development of the Motorcycle Industry in Indonesia," in Pangestu, M. and Y. Sato (eds.), *Waves of Change in Indonesia's Manufacturing Industry*, Tokyo: Institute of Developing Economies.

Thee, K. W., 2000, "The Impact of the Economic Crisis on Indonesia's Manufacturing Sector," *Developing Economies*, Vol. 38, No. 4, pp. 420-53.

Timmer, M. P., 1999, "Indonesia's Ascent on the Technology Ladder: Capital Stock and Total Factor Productivity in Indonesian Manufacturing, 1975-95," *Bulletin of Indonesian Economic Studies*, Vol. 35, No. 1, pp. 75-97.

Tominaga, N., 1999, *Kin Yushutsu Saikinshigo no Nihon Keizai no Yakushin to Ko-seicho Shohin* (Great Advance in the Japanese Economy and High Growth Products after the Abandonment of the Gold Standard), Hiroshima: Keisuisha.

Toyozaki, M., 1949, *Nihon Kikai Kogyo no Kiso Kozo* (Basic Structure of the Japanese Machinery Industry), Tokyo: Nihon Hyoronsha.

Tybout, J. R., 2000, "Manufacturing Firms in Developing Countries: How Well Do They Do, and Why?," *Journal of Economic Literature*, Vol. 38, No. 1, pp. 11-44.

UNIDO, 2000, *Indonesia: Strategy for Manufacturing Competitiveness Vol. II Main Report*, Jakarta: UNIDO.

Urata, S., 1995, *Chusho Kigyo ni okeru Gijyutsu Shinpo to Shitauke Seido* (Technological Progress and Subcontracting Systems for SMEs), Tokyo: Economic Planning Agency.

Urata, S., 2000, *Policy Recommendation for SME Promotion in the Republic of Indonesia*, Tokyo: Ministry of International Trade and Industry (MITI).

Van der Eng, P., 2002, "Indonesia's Growth Performance in the Twentieth Century," in Maddison, A. and W.S. Shepherd (eds.), *The Asian Economies in the Twentieth Century*, London: Edward Elgar.

Van Diermen, P., 1997, *Small Business in Indonesia*, Aldershot: Ashgate.

Watanabe, S., 1971, "Subcontracting, Industrialisation and Employment Creation," *International Labour Review*, Vol. 104, No. 1-2, pp. 51-76.

Watanabe, S., 1974, "Reflections on Current Policies for Promoting Small Enterprises and Subcontracting," *International Labour Review*, Vol. 110, No. 5, pp. 405-22.

Weijland, H., 1999, "Microenterprise Clusters in Rural Indonesia: Industrial Seedbed and Policy Target," *World Development*, Vol. 27, No. 9, pp. 1515-30.

Whittaker, D. H., 1997, *Small Firms in the Japanese Economy*, New York: Cambridge University Press.

Williamson, O. E., 1975, *Markets and Hierarchies: Analysis and Antitrust Implications*, New York: Free Press.

Williamson, O. E., 1985, *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, New York: Free Press.

Witoelar, W., 1983, "Ancillary Firm Development in the Motor Vehicle Industry in Indonesia," in Odaka, K. (ed.), *The Motor Vehicle Industry in Asia: A Study of Ancillary Firm Development*, Singapore: Singapore University Press.

Yamamura, K., 1997, "Entrepreneurship, Ownership, and Management in Japan," in Yamamura, K. (ed.), *The Economic Emergence of Modern Japan*, New York: Cambridge University Press.

Yamazawa, I., 1984, *Nihon no Keizai Hatten to Kokusai Bungyo* (Economic Development in Japan and International Division of Labour), Tokyo: Toyo Keizai Shinposha.

Yamazawa, I. and Y. Yamamoto, 1979, *Estimates of Long-term Economic Statistics of Japan since 1868: Vol. 14 Foreign Trade and Balance of Payments*, Tokyo: Toyo Keizai Shinposha.

Yasuba, Y., 1976, "The Evolution of Dualistic Wage Structure," in Patrick, H. (ed.), *Japanese Industrialization and Its Social Consequences*, Berkeley: University of California Press.

Yellen, J. L., 1984, "Efficiency Wage Models of Unemployment," *American Economic Review*, Vol. 74, No. 2, pp. 200-5.

Yokokura, T., 1984, "Chusho Kigyo" (Small and Medium Enterprises), in Komiya, R., M. Okuno and K. Suzumura (eds.), *Nihon no Sangyo Seisaku* (Industrial Policy of Japan), Tokyo: University of Tokyo Press.

Yoshihara, K., 1994, *Japanese Economic Development*, New York: Oxford University Press.

Yui, T., 1994, "Chusho Kogyo" (Small- and Medium-scale Industries), in Arisawa, H. *et al.* (eds.), *Nihon Sangyo-shi: 1* (History of Japanese Industry: Vol. 1), Tokyo: Nihon Keizai Shinbunsha.

Yuwono, P, Supramono and P. Rietveld, 1994, "Subcontracting in Small Scale Industry Clusters: the Case of the Copper Industry of Tumang, Indonesia," *Ekonomi dan Keuangan Indonesia*, Vol. 42, No. 4, pp. 355-72.

Zhao, H. and H. C. Co, 1997, "Adoption and Implementation of Advanced Manufacturing Technology in Singapore," *International Journal of Production Economics*, Vol. 48, No. 1, pp. 7-19.